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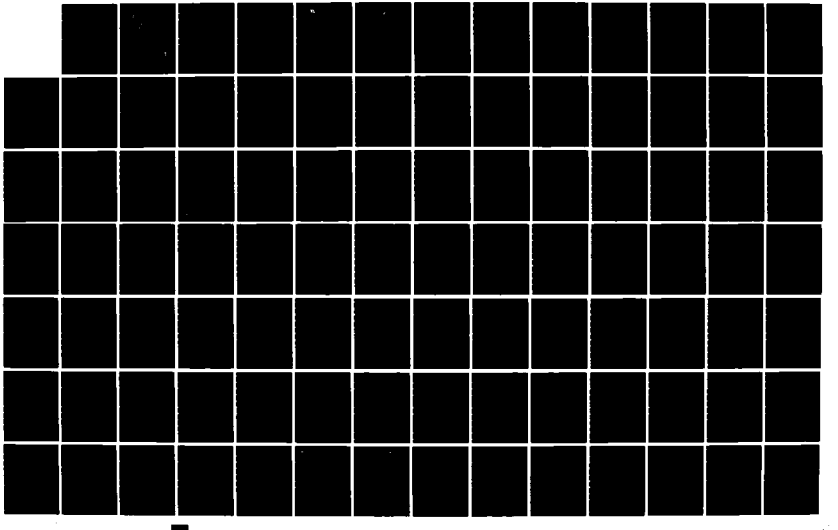

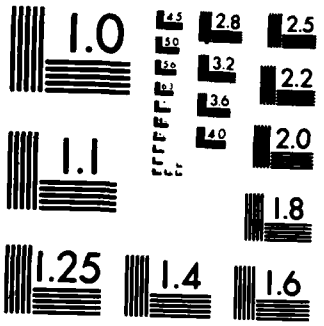
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DEPARTMENT OF TRANSPORTATION

COAST GUARD

COMMANDANT'S INTERNATIONAL TECHNICAL SERIES

Code of Safety for Fishermen and Fishing Vessels - Part B

SAFETY AND HEALTH REQUIREMENTS FOR THE CONSTRUCTION AND EQUIPMENT OF FISHING VESSELS

Report No. USCG CITS-73-1-1

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CAUTIONARY NOTE

The recommendations proposed herein are specifically tailored to commercial fishing vessels that are decked, and greater than 79 feet in length.

The reader is cautioned that application of the formulas in this Code to other types of vessels or to the many commercial fishing vessels shorter than 79 feet should be carefully considered.

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THE COMMANDANT OF THE UNITED STATES COAST GUARD
WASHINGTON 20590

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TO UNITED STATES MARITIME RESEARCH INTERESTS:

CODE OF SAFETY FOR FISHERMEN AND FISHING VESSELS - PART B

The United States Coast Guard is charged, under the Department of Transportation, with overall administration of maritime safety matters. Our regulatory function is a preventive program, companion to our search and rescue activity. Consequently, the Department of State has regularly accredited Coast Guard naval architects and marine engineers to represent the United States in deliberations of various technical subcommittees under the Maritime Safety Committee of the Intergovernmental Maritime Consultative Organization (IMCO), an agency of the United Nations.

In the course of these representations, Coast Guard professional personnel obtain from their foreign counterparts a great deal of technical and research information relative to safety at sea. While this data has ordinarily been made available to industry members of the Safety of Life at Sea Subcommittee and its Working Groups in the course of developing national positions, I would like to ensure that this valuable information is receiving the distribution it deserves.

It is the purpose of this document series to assure, as a service to the maritime community, that these papers reach universities, naval architecture firms, research organizations, and others with a recognized interest. The Department of Transportation and the Coast Guard must, perforce, disavow responsibility for the accuracy of the information enclosed.

This part of the Code is NOT an International Convention. It is a set of recommendations from the maritime organization of the United Nations. (Intergovernmental Maritime Consultative Organization).

It has been developed by the Subcommittee on Safety of Fishing Vessels which was set up in 1964 in response to the several strong recommendations regarding fishing vessels which were added to the 1960 Safety of Life at Sea Convention.

It is offered through this special printing to all U.S. fishermen and their associates in the interest of improving safety in our fleets.

Toward our common goal of safety at sea,

C R Bender

C. R. BENDER
Admiral, U. S. Coast Guard

INTER-GOVERNMENTAL MARITIME
CONSULTATIVE ORGANIZATION

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SUB-COMMITTEE ON SAFETY OF
FISHING VESSELS - 13th session
Agenda item 9

REPORT TO THE MARITIME SAFETY COMMITTEE

Attached hereto is Annex II of PFV XIII/9.

ANNEX II

CODE OF SAFETY FOR FISHERMEN AND FISHING VESSELS

Part B - Safety and Health Requirements for the Construction and Equipment of Fishing Vessels

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Chapter I - General provisions

1.1 Purpose and Scope

1.1.1 The purpose of this Part of the Code is to provide information on design, construction and equipment of fishing vessels with a view to promoting the safety of the vessel and safety and health of the crew; it is not a substitute for national laws and regulations. Only minimum requirements to ensure the safety of fishing vessels are given and each competent authority should take every possible measure to promote the safety of the vessels concerned.

1.1.2 Unless otherwise stated, the provisions of this Part of the Code are intended to apply to new decked fishing vessels of 24 m in length and above and in the following categories:

Category 1 - Vessels for unlimited service;

Category 2 - Vessels proceeding to sea up to 200 miles from a place of shelter;

Category 3 - Vessels proceeding to sea up to 50 miles from a place of shelter.

These provisions should apply as far as reasonable and practicable to existing decked fishing vessels but do not apply to fishing vessels for sport or recreation or to processing vessels.

1.1.3 Where operating experience has clearly shown that departure from the provisions of this Part of the Code is justified, or in applying this Part of the Code to any other equivalent area of operation for any vessel covered by this Part of the Code, the competent authority may permit adequate alterations or substitutions thereof.

Where the designed waterline is not known, the standard waterline is to be placed perpendicularly to the plane of the transverse bulkheads and frames.

The waterplane defined by the standard waterline is to be taken as the horizontal co-ordinate for framework used in integrating hull areas and volumes, unless otherwise specifically mentioned.

The terms "vertical" and "horizontal" used in this document mean vertical and horizontal to the standard waterline.

(x) Aft and forward perpendiculars* are vertical lines intersecting the standard waterline:

(a) on the inside of the stern plating and on the inside of the stem plating, respectively, of a vessel with a metal shell, or

(b) at the rabbet aft line of the stern and at the rabbet front line of the stem, respectively, of a vessel with a shell of any other material or of a composite vessel.

The forward and aft terminals of any other waterline are parallels to the perpendiculars intersecting the ends of the vessel as described in (a) and (b) above.

(xi) Length (L_s)* is the standard waterline length measured horizontally between perpendiculars.

(xii) Breadth (B)* is the maximum width measured:

(a) to the moulded line of the frame of a vessel with a metal shell; or

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* See footnote on page 8.

(b) to the outer surfaces of the hull of a vessel with a shell of any other material or of a composite vessel;

Specific breadths are indicated by indices, e.g.:

B_s - standard waterline breadth: maximum width at the standard waterline;

B_{oa} - overall breadth; extreme width of the vessel measured to the outer surface of the hull.

(xiii) Depth (D_n)* is the amidships depth and is the vertical distance at side measured from the top of deck beams at the freeboard deck as defined in (xix) to the keel line as defined in (xvii) plus the minimum thickness of decking.

(xiv) Freeboard (f_{min})* is the actual minimum freeboard and is the distance from the underside of the freeboard deck at the side to a waterline, measured perpendicularly to the waterline, plus the minimum thickness of decking.

(xv) Amidships (index n) is the mid-length of the standard waterline length (L_s).

(xvi) Midship section is that section of the hull defined by the intersection of the moulded surface of the hull with a vertical plane perpendicular to the water and centreline planes passing through amidships.

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* See footnote on page 8.

(xvii) Keel line* is the line parallel to the slope of keel passing amidships through:

(a) the top of the keel or line of intersection of the inside of shell plating with the keel where a bar keel extends above that line of a vessel with a metal shell; or

(b) the rabbet lower line of keel of a vessel with a shell of any other material or a composite vessel.

(xviii) Baseline* is the horizontal line intersecting at amidships the keel line.

(xix) Freeboard deck is normally the uppermost complete deck exposed to the weather and sea which has permanent means of closing all openings in the weather part thereof and below which all openings in the side of the vessel are fitted with permanent means of closing watertight. In a vessel having a discontinuous freeboard deck, the lowest line of the exposed deck and the continuation of that line parallel to the upper part of the deck is to be taken as the freeboard deck.

A lower deck may be designated as the freeboard deck provided that it is a complete and permanent deck continuous in a fore and aft direction at least between the machinery spaces and peak bulkheads and continuous athwartships. When this lower deck is stepped, the lowest line of the deck and the continuation of that line parallel to the upper part of the deck is to be taken as the freeboard deck. When a lower deck is designated as the freeboard deck, that part of the hull which extends above the freeboard deck is treated as superstructure.

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* See footnote on page 8.

(xx) Superstructure is the decked structure on the freeboard deck extending from side to side of the vessel or with the side plating not being inboard of the shell plating more than 4 per cent of the overall breadth (B_{oa}). Enclosed superstructure is a superstructure with:

(a) enclosing bulkheads of efficient construction;

(b) access openings, if any, in those bulkheads fitted with permanently attached weathertight doors of a strength equivalent to the unpierced structure which can be operated from either side; and

(c) other openings in sides or ends of the superstructure fitted with efficient weathertight means of closing.

A raised quarter-deck is regarded as a superstructure.

A bridge or poop shall not be regarded as enclosed unless access is provided for the crew to reach machinery and other working spaces inside these superstructures by alternative means which are available at all times when bulkhead openings are closed.

(xxi) Superstructure deck is that complete or partial deck or the top of a superstructure, deckhouse or other erections situated at a height of not less than 1.8 m above the freeboard deck.

(xxii) Height of a superstructure or other erection is the least vertical distance measured at side from the top of the deck beams of a superstructure or an erection to the top of the freeboard deck beams.

(xxiii) Weathertight means that in any sea conditions water will not penetrate into the vessel.

(xxiv) Watertight means capable of preventing the passage of water through the structure in any direction under a head of water up to the superstructure deck.

(xxv) Control stations are those spaces in which a vessel's radio or main navigating equipment or the emergency source of power is located, or where the fire recording or fire control equipment is centralized.

(xxvi) "B" Class division has the same meaning as "B" Class division in Regulation 94(c)(ii) of Chapter II of the 1960 Convention.

1.2.2 In this Part of the Code measurements are given in the metric system using the following abbreviations:

m	-	metre
cm	-	centimetre
mm	-	millimetre
t	-	tonne (1.000 kg)
kg	-	kilogramme
mt	-	metre - tonne
^{o}C	-	degree centigrade
Sec	-	second
BHP	-	brake horse power of 75 $\frac{kg.m}{Sec}$

1.3 Surveys

1.3.1 The hull, machinery, equipment and radio installations should be surveyed on completion and thereafter in such manner and at such intervals as the competent authority or a classification society recognized by the competent authority may consider necessary in order to ensure that their condition is in all respects satisfactory. The surveys should be such as to ensure that the arrangements, material, and scantlings of the structure, boilers and other pressure vessels and their

appurtenances, main and auxiliary machinery, electrical installations and other equipment are in all respects satisfactory for the service for which the vessel is intended.

1.3.2 After any survey has been completed, no change should be made in the structural arrangements, machinery, equipment, etc., covered by the survey, without the sanction of the competent authority.

Chapter II - Hull and Equipment

2.1 Construction

2.1.1 Strength and construction of hull, superstructure, deckhouses, machinery casings, companionways and any other structures and vessel's equipment should be sufficient to withstand all foreseeable conditions of the intended service and should be to the satisfaction of the competent authority. A vessel built and maintained in conformity with the rules of a classification society recognized by the competent authority for the intended service may be considered to be adequate in this respect.

2.1.2 The hull of a vessel intended for operation in ice should be strengthened in accordance with the anticipated conditions of navigation and area of operation.

2.1.3 Bulkheads, closing devices and closures of openings in these bulkheads, as well as methods for their testing, should be in accordance with the requirements of the competent authorities or recognized classification societies. Vessels of material other than wood should be fitted with a watertight bulkhead in the fore part to provide protection in the event of collision and further should be fitted at least with watertight bulkheads bounding the main machinery space. Such bulkheads should be extended up to the freeboard deck. In vessels of wood such bulkheads should also be fitted, which are substantially watertight.

2.1.4 The forepeak should not be arranged for carrying fuel oil.

2.1.5 Watertight doors fitted in watertight bulkheads should be capable of being opened and closed locally at the door on either side and preferably also from above the freeboard deck. Means of operating doors should be clearly marked, and should indicate whether doors are open or closed. Watertight doors below the freeboard deck should not be fitted in the collision bulkhead.

2.2 Steering Gear

2.2.1 Vessels should be provided with a main steering gear and with an auxiliary means of actuating the rudder, to the satisfaction of the competent authority.

2.2.2 The main steering gear should be of adequate strength and sufficient to steer the vessel at maximum service speed. The main steering gear and rudder stock should be so designed that they are not damaged at maximum astern speed.

2.2.3 The auxiliary means of actuating the rudder should be of adequate strength and sufficient to steer the vessel at navigable speed. It should be capable of being brought speedily into action in an emergency.

2.2.4 Where power-operated steering gear units and connections are fitted in duplicate, either unit operating alone should comply with 2.2.3, and the duplicate units and connections operating together should comply with 2.2.2. An auxiliary steering gear need not be provided.

2.2.5 A rudder angle indicator should be provided at the principal steering station.

2.2.6 Steering gear should be so constructed that no violent recoil of the steering wheel may occur.

2.3 Anchor and mooring equipment

2.3.1 Each vessel should be provided with anchoring equipment designed for quick and safe operation in all foreseeable service conditions. Anchor equipment should consist of anchors, anchor cables or chains, stoppers and a windlass or other arrangements for dropping and heisting the anchor and for holding the ship at anchor.

2.3.2 Anchor and mooring equipment should comply with the requirements of the competent authority or those of a classification society recognized by the competent authority. The recommended practice for anchor and mooring equipment is shown at Annex II.

2.4 Bulwarks, rails and guards

2.4.1 Efficient bulwarks or guard rails should be fitted on all exposed parts of the freeboard deck and on superstructure and deckhouse decks if they are working platforms. The height above deck of bulwarks or guard rails should be at least 1.0 m, provided that where this would interfere with the normal operation of the vessel, a lesser height may be approved by the competent authority if adequate protection is provided.

2.4.2 Clearance below the lowest course of guard rails should not exceed 230 mm. Other courses should not be more than 300 mm apart, and the distance between stanchions should not be more than 1.5 m. In a vessel with rounded gunwales, guard rail supports should be placed on the flat of the deck. Rails should be free from sharp points, edges and corners and should be of adequate strength.

2.4.3 Satisfactory means in the form of guard rails, lifelines, gangways or underdeck passages, etc., should be provided for the protection of the crew in getting to and from their quarters, machinery spaces and other working spaces. Storm rails should be fitted on the outside of all deckhouses and casings.

2.4.4 A stern trawler should be provided with doors, gates or other suitable protective arrangements at the top of the stern ramp at the same height as the adjacent bulwarks. A chain or other means should be provided for fitting a guard across the ramp when the doors, etc., are open.

Chapter III - Freeboard, watertight integrity and freeing ports

3.1 Freeboard

At the maximum displacement possible for the intended service the vessel should have appropriate minimum freeboard to provide:

(i) compatibility with the stability criteria referred to in 4.2;

(ii) reasonable degree of safety for men required to work on deck; and

(iii) reasonable degree of safety to the vessel in respect of preventing entry of water into enclosed spaces having regard to the closing appliances provided and of the influence of water being shipped and trapped on deck.

3.2 Watertight integrity

Openings through which water can enter and endanger the vessel should be kept to a minimum and provided with effective closing devices in accordance with the provisions of this Section. Where closing devices fitted to such openings are of types, or of materials other than those specified in this Section, they should be equivalent thereto and to the satisfaction of the competent authority.

3.3 Doors

Doors should be permanently attached to the bulkhead, properly framed and stiffened so that the strength is equivalent to the unpierced structure. They should be capable of being closed weathertight to the satisfaction of the competent authority and means should be provided so that they can be operated from either side.

Wood hatchway covers

3.4.1 The finished thickness of the wood hatchway covers should be at least 40 mm in association with a span of not more than 1.0 m and the width of their bearing surfaces should be at least 65 mm.

3.4.2 Wood hatchway covers should be secured weathertight to the satisfaction of the competent authority.

3.5 Hatchway covers other than wood

3.5.1 For the purpose of strength calculations it should be assumed that hatchway covers other than wood are subjected to the weight of cargo intended to be carried on them or to the following static loads, whichever is the greater:

1.0 t/m^2 for vessels of 24 m in length;

1.75 t/m^2 for vessels of 100 m in length and over.

For intermediate lengths the load values should be determined by linear interpolation.

The competent authority may reduce the loads to not less than 75 per cent of the above values for covers to hatchways situated on the superstructure deck in a position abaft a point 25 per cent of the length of the vessel measured from the forward perpendicular.

3.5.2 Where covers are constructed of mild steel, the maximum stress according to 3.5.1 multiplied by 4.25 should not exceed the minimum ultimate strength of the material. Under these loads the deflections should be not more than 0.0028 times the span.

3.5.3 Strength and stiffness of covers made of materials other than mild steel should be equivalent to those of mild steel.

3.5.4 Covers should be fitted with clamping devices and gaskets sufficient to ensure weathertightness, or other equivalent arrangements to the satisfaction of the competent authority.

3.6 Machinery space openings

3.6.1 Machinery space openings should be properly framed and efficiently enclosed by casings of ample strength. External access openings therein should be fitted with doors complying with the provisions of 3.3.

3.6.2 Openings other than access openings should be fitted with strong covers of equivalent strength to the unpierced structure, permanently attached thereto and capable of being closed weathertight.

3.7 Other deck openings

3.7.1 Where it is essential for fishing operations, flush deck scuttles of the screw, bayonet or equivalent type and manholes may be fitted provided these are capable of being closed watertight and such devices should be permanently attached to the structure. Having regard to the size and disposition of the openings and the design of the closing devices, metal-to-metal closures may be fitted if the competent authority is satisfied that they are effectively watertight.

3.7.2 An efficient superstructure, deckhouse or companionway, fitted with weathertight doors or their equivalent, should be provided to protect openings, other than hatchways, machinery space openings, manholes and flush scuttles in the freeboard or superstructure deck. Companionways should be situated as close as practicable to the centreline of the vessel.

3.8 Ventilators

3.8.1 Coamings of ventilators should be of substantial construction and capable of being closed weathertight by devices permanently attached to the ventilator or adjacent structure.

3.8.2 Closing appliances in vessels of categories 1 and 2 need not be fitted to ventilators in which the coamings extend more than 4.5 m above the freeboard deck or more than 2.3 m above the superstructure deck unless specifically required by the competent authority. In vessels of category 3 these figures may be reduced to 3.4 m and 1.7 m respectively.

3.9 Air pipes

Where air pipes to tanks and other spaces below deck extend above the freeboard or the superstructure deck, the exposed parts of the pipes should be of substantial construction.

Openings of air pipes should be provided with efficient means of closing, permanently attached to the pipe or adjacent structure.

3.10 Sidescuttles

3.10.1 Sidescuttles leading to spaces below the freeboard deck or to enclosed erections on the freeboard deck should be fitted with hinged deadlights capable of being closed watertight.

3.10.2 No sidescuttle should be fitted in a position such that its sill is below a line drawn parallel to the freeboard deck at side and having its lowest point 500 mm above the highest load waterline. In vessels of category 3 this figure may be reduced to 375 mm.

3.10.3 Sidescuttles, together with their glasses and deadlights should be of a substantial construction to the satisfaction of the competent authority.

3.11 Side openings

Openings in the sides of the vessel below the freeboard deck should be the minimum number compatible with the design and proper working of the vessel. Such openings should be fitted with means of closing so designed as to ensure watertightness and structural integrity commensurate with the surrounding shell structure.

3.12 Scuppers, inlets and discharges

3.12.1 Discharges led through the shell either from spaces below the freeboard deck or from within superstructures or deckhouses as mentioned in 4.5.3 and 4.5.4 should be fitted with efficient and accessible means for preventing water from passing inboard. Normally each separate discharge should have an automatic non-return valve with a positive means of closing it from a readily accessible position. Such a valve is not required if the competent authority considers that the entry of water into the vessel through the opening is not likely to lead to dangerous flooding and that the thickness of the piping is sufficient.

3.12.2 In manned machinery spaces main and auxiliary sea inlets and discharges essential for the operation of machinery may be controlled locally. Controls should be readily accessible and should be provided with indicators showing whether the valves are open or closed.

3.12.3 In unmanned fully automated machinery spaces the provisions of 3.12.2 should apply provided suitable warning devices are incorporated to indicate leakage of water into the space or leakage from any other systems. In such spaces the controls should be readily accessible and be provided with indicators at the control position showing whether the valves are open or closed.

3.12.4 Fittings attached to the shell and all valves should be of steel, bronze or other ductile material approved by the competent authority. All pipes between the shell and valves should be of steel, except that in vessels constructed of material other than steel the competent authority may approve the use of other materials.

3.13 Heights of hatchway coamings and sills of doorways, ventilators and air pipes

3.13.1 The height above deck of hatchway coamings on exposed parts of the freeboard deck should be at least 600 mm and on the superstructure deck at least 300 mm.

3.13.2 Where operating experience has shown justification and on the approval of the competent authority, the height of hatch coamings may be reduced from the heights specified in 3.13.1 or the coaming may be omitted entirely, provided efficient watertight hatch covers are fitted. Such covers should be kept as small as practicable, be permanently attached by hinges or equivalent means and be capable of being rapidly closed and battened down.

3.13.3 The height above deck of sills in those doorways, in companionways, erections and machinery casings which give direct access to parts of the deck exposed to the weather and sea should be at least 600 mm on the freeboard deck and at least 300 mm on the superstructure deck.

3.13.4 Where operating experience has shown justification and on approval of the competent authority, the height above deck of sills in the doorways specified in 3.13.3, except those giving direct access to machinery spaces, may be reduced to not less than 380 mm on the freeboard deck and to not less than 150 mm on the superstructure deck.

3.13.5 The height above deck of ventilators on the freeboard deck should be at least 900 mm and on the superstructure deck at least 760 mm. The height of ventilators of machinery spaces should be as high as reasonable and practicable and to the satisfaction of the competent authority.

3.13.6 The height of air pipes above deck to a point where water may have access below should be at least 760 mm on the freeboard deck and at least 450 mm on the superstructure deck. The competent authority may accept reduction of the height of an air pipe to avoid interference with the fishing operations provided its efficiency as a closing appliance is not impaired.

3.14 Freeing ports

3.14.1 Where bulwarks on weather parts of the freeboard deck form wells, the minimum freeing port area (A) in square metres, on each side of the vessel for each well on the freeboard deck should be determined in relation to the length (ℓ) and height of bulwark in the well as follows:

(i) $A = 0.7 + 0.035\ell$ where ℓ is 20 m or less; or
$A = 0.07\ell$ where ℓ exceeds 20 m
ℓ need in no case be taken as greater than 0.7 times the length of the vessel (L).

(ii) Where the bulwark is more than 1.2 m in average height the required area should be increased by 0.004 m^2 per metre of the length of well for each 0.1 m difference in height.

Where the bulwark is less than 0.9 m in average height, the required area may be decreased by 0.004 m^2 per metre of length of well for each 0.1 m difference in height.

3.14.2 The competent authority may consider it necessary to increase the freeing ports area (A) given in 3.14.1 where there is a deficiency in the vessel's sheer.

3.14.3 Subject to the approval of the competent authority the minimum freeing port area for each well on the superstructure deck should be not less than one-half the area (A) given in 3.14.1.

3.14.4 Freeing ports should be so arranged along the length of bulwarks as to provide the most rapid and effective freeing the deck of water. Lower edges of freeing ports should be as near the deck as practicable.

3.14.5 Devices for locking freeing port covers should be considered generally as being dangerous. If locking devices in particular cases are considered necessary for the service of the vessel they should be to the satisfaction of the competent authority and easily operable from a readily accessible position. Freeing ports over 300 mm in depth should be fitted with bars spaced not more than 230 mm apart or with other suitable protective arrangements.

3.14.6 Stowage racks, etc., for fishing gear should be arranged so that the effectiveness of freeing ports will not be impaired.

3.14.7 In a vessel intended to operate in areas subject to icing, covers and protective arrangements for freeing ports should be capable of being removed to restrict ice accumulation. Size of opening and means provided for removal of these protective arrangements should be to the satisfaction of the competent authority.

Chapter IV - Stability

4.1 General

4.1.1 A vessel should be designed and constructed to provide adequate intact stability for the anticipated service conditions.

4.1.2 Righting lever curves should be calculated for the standard conditions given in 4.6 and for the main loading conditions intended by the owner in respect of the vessel's operations where these loading conditions differ significantly from the standard conditions.

4.1.3 Methods and procedures employed for calculating righting levers should be in accordance with 4.5 and the degree of accuracy obtained should be acceptable to the competent authority.

4.1.4 Wherever practicable guidance should be provided for an approximate determination of the vessel's stability by means of the rolling period test including values of rolling coefficients particular to the vessel. A suggested form for such guidance is shown at the Appendix to the Memorandum to Administrations in this respect reproduced at Annex III to this Part of the Code.

4.2 Stability criteria

4.2.1 The following minimum stability criteria should be applied unless the competent authority is satisfied that operating experience justifies departure therefrom:

(i) The area under the righting lever curve (GZ curve) should not be less than 0.055 metre-radians up to 30° angle of heel and not less than 0.09 metre-radians up to 40° or the angle of flooding θ_f* if this angle is less than 40°;

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* θ_f is an angle of heel at which openings in the hull, superstructures or deckhouses which cannot be closed watertight immerse. In applying this criterion, small openings through which progressive flooding cannot take place need not be considered as open.

additionally, the area under the GZ curve between the angles of heel of 30° and 40° or between 30° and θ_f, if this angle is less than 40°, should not be less than 0.03 metre-radians;

(ii) the righting lever GZ should be at least 0.20 m at an angle of heel equal to or greater than 30°;

(iii) the maximum righting lever GZ_{max} should occur at an angle of heel preferably exceeding 30° but not less than 25°; and

(iv) the initial metacentric height GM_o should not be less than 0.35 m.

4.2.2 Stability characteristics should be avoided which might lead to acceleration forces which could be prejudicial to the safety of the vessel and the crew.

4.2.3 For a vessel with L less than 30 m for which, by reason of insufficient stability data, 4.2.1 cannot be applied, the following formula for the minimum metacentric height GM_{min} for all operating conditions should be used as the criterion:

$$GM_{min} = 0.53 + 2B\sqrt{0.075-0.37\left(\frac{f_{min}}{B_s}\right)+0.82\left(\frac{f_{min}}{B_s}\right)^2-0.014\left(\frac{B_s}{D_m}\right)-0.032\left(\frac{\ell_s}{L_s}\right)}$$

where: L_s, B_s, D_m and f_{min} in m are as defined in 1.2.1(xi) to (xiv); and

ℓ_s = Actual length in m of a superstructure as defined in 1.2.1(xx),

The formula is applicable for vessels having:

(i) $\frac{f_{min}}{B_s}$ between 0.02 and 0.20;

(ii) $\frac{\ell_s}{L_s}$ smaller than 0.60;

(iii) $\frac{B_s}{D_m}$ between 1.75 and 2.15;

(iv) sheer fore and aft at least equal to or exceeding the standard sheer prescribed in Regulation 38(8) of the 1966 Convention;

(v) height of superstructure included in the calculation not less than 1.8 m.

In applying the formula the actual GM_o should be known to a sufficient degree of accuracy. If a rolling test, an inclining experiment based on estimated displacement, or another approximate method of determining the actual GM is used, a safety margin should be added to the calculated GM_{min}.

4.2.4 Where anti-rolling devices other than bilge keels are installed, the competent authority should be satisfied that the stability criteria (given in 4.2.1) can be maintained when the devices are in operation.

4.2.5 A number of influences such as beam wind on vessels with large lateral area, water trapped on deck, following seas, etc. adversely affect stability and should be taken into account as well as the vessel's rolling characteristics, so far as is deemed necessary by the competent authority. For a vessel intended for operation in a zone subject to icing reference should be made to 4.7.

4.3 Inclining test

4.3.1 A vessel should undergo an inclining test upon completion and the actual displacement and co-ordinates of the centre of gravity determined for the light ship condition. When alterations are made affecting the stability of the vessel, the vessel should be re-inclined and the light ship condition data revised if the competent authority considers this to be necessary.

4.3.2 The competent authority may allow the inclining test of an individual vessel to be dispensed with, provided basic stability data are available from the inclining test of a sister ship.

4.4 Stability information

4.4.1 The skipper should have on board information which will enable him to assess with ease and certainty the stability of the vessel in different service conditions and to verify whether the stability is sufficient in conditions differing from the standard ones in 4.6. A duplicate of this information should be communicated to the competent authority.

4.4.2 Where considered necessary by the competent authority stability information should comprise:

(i) stability characteristics of typical loading condition;

(ii) information in the form of tables or diagrams giving as a function of draughts the required GM_o (or any other stability parameter) which ensures that the stability is in compliance with the criteria given in 4.2.1;

(iii) information on the proper use of anti-rolling devices where installed;

(iv) information if possible for determination of GM_o by means of a rolling test;

(v) notes on the corrections to be made to GM_o to take account of free surfaces of liquids;

(vi) information on the use of ballast systems to correct a list;

(vii) note that any permanent solid or liquid ballast is not to be removed; and

(viii) forms for recording daily tank statements.

4.4.3 Scales indicating the vessels's draughts should be permanently marked on both sides of the sten and stern. These scales should be measured perpendicularly from a datum line which will lie along, or be a projection of, the lower extremity of the keel or other lower appendage. Numbers 0.10 m in the vertical plane should be marked on the scale, the lower edge or each number indicating the draught in metres. Between the numbers lines should be marked, parallel to the datum, at intervals of 0.10 m. The skipper should be provided with information defining the position of the datum line and instructions regarding the use of observed draughts.

4.4.4 If any alterations are made affecting the stability of the vessel, the skipper should be supplied with amended stability information and a copy should be communicated to the competent authority.

4.5 Calculation of righting lever curves

4.5.1 Hydrostatic and stability curves should normally be prepared on a designed trim basis. However, where the operating trim or form and arrangement of the vessel are such that change in trim has an appreciable effect on righting levers, such change in trim should be taken into account, and be stated in the stability information.

4.5.2 Calculations should take into account the volume to the upper surface of the deck sheathing.

4.5.3 Superstructures on the freeboard deck complying with 1.2.1(xx) and 3.13 may be taken into account in the calculations, as well as those on the second tier.

4.5.4 Deckhouses on the freeboard deck provided with an exit to a deck above may be taken into account provided they comply with the conditions for superstructures and door sills in 1.2.1(xx) and 3.13.

4.5.5 Deckhouses complying with 4.5.4 but without an exit to a deck above, should not be taken into account; however, any deck openings inside such deckhouses should be regarded as closed even where no means of closure are provided. In the case of deckhouses in which, due to smallness of the vessel, an additional exit would be impracticable, the competent authority may permit their inclusion in the stability calculations.

4.5.6 Deckhouses on the freeboard deck, the doors of which do not comply with the provisions of 3.3, should be disregarded; however, any deck openings inside the deckhouse should be regarded as closed where their means of closure comply with 3.4 to 3.7.

4.5.7 Deckhouses on decks above the freeboard deck should not be considered, but inside openings may be regarded as closed.

4.5.8 Superstructures and deckhouses not regarded as enclosed may in special circumstances be included in stability calculations up to an angle at which flooding through openings could take place, provided this does not lead to subsequent serious flooding of the vessel. At that angle, the righting lever curve should show one or more steps, due to the loss of buoyancy of flooded spaces.

4.5.9 Where the vessel would sink due to flooding through any openings, the righting lever curve should be cut short at the corresponding angle indicating the entire loss of stability.

4.5.10 Small openings for passing wires, chains or tackles, discharge scuppers etc. immersing at an angle of inclination more than 30° should be considered as closed, but if immersing at 30° or less, they should be regarded as open if the competent authority considers them to be a source of significant flooding.

4.5.11 Trunks may be taken into account as well as hatchways if the effectiveness of their closures corresponds to 3.4 and 3.5.

4.5.12 For all conditions of loading GM_o and GZ curves should be corrected for the effect of free surfaces of liquids in tanks in accordance with the following assumptions:

(i) calculations should include single tanks or combinations of tanks for each kind of liquid (including those for water ballast) which according to the service conditions can simultaneously have free surfaces;

(ii) tanks assumed slack should be those which develop the greatest free surface moment at 30° inclination $M_{fs\ 30^o}$ in the 50 per cent full condition;

(iii) free surface moment M_{fs} in mt for each tank at any angle of inclination may be derived from the formula:

$$M_{fs} = vb\gamma k\sqrt{\delta}$$

where:

v = max. tank capacity - m^3,

b = max. tank breadth - m,

γ = specific weight of liquid in the tank - t/m^3,

$\delta = \frac{v}{b\ell h}$ = tank block coefficient,

h = max. tank height - m,

ℓ = max. tank length - m,

k = coefficient.

(iv) k may be determined either from the following table, intermediate values being found by linear interpolation, or direct from the formulae:

$$k = \frac{\sin\theta}{12}\left(1 + \frac{\tan^2\theta}{2}\right) b/h$$

where $\cot\theta > b/h$; or

$$k = \frac{\cos\theta}{8}\left(1 + \frac{\tan\theta}{b/h}\right) - \frac{\cos\theta}{12(b/h)}\,2\left(1 + \frac{\cot^2\theta}{2}\right)$$

where $\cot\theta < b/h$

TABLE OF COEFFICIENT X FOR CALCULATING FREE SURFACE CORRECTIONS

b/a \ θ	5°	10°	15°	20°	30°	40°	45°	50°	60°	70°	75°	80°	90°	θ b/a
20	0.11	0.12	0.12	0.12	0.11	0.10	0.09	0.09	0.07	0.05	0.04	0.03	0.01	20
10	0.07	0.11	0.12	0.12	0.11	0.10	0.10	0.09	0.07	0.05	0.04	0.03	0.01	10
5	0.04	0.07	0.10	0.11	0.11	0.11	0.10	0.10	0.08	0.07	0.06	0.05	0.03	5
3	0.2	0.04	0.07	0.09	0.11	0.11	0.11	0.10	0.09	0.08	0.07	0.06	0.04	3
2	0.01	0.03	0.04	0.06	0.09	0.11	0.11	0.11	0.10	0.09	0.09	0.08	0.06	2
1.5	0.01	0.02	0.03	0.05	0.07	0.10	0.11	0.11	0.11	0.11	0.10	0.10	0.08	1.5
1	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.10	0.12	0.13	0.13	0.13	0.13	1
0.75	0.01	0.01	0.02	0.02	0.04	0.05	0.07	0.08	0.12	0.15	0.16	0.16	0.17	0.75
0.5	0.00	0.01	0.01	0.02	0.02	0.04	0.04	0.05	0.09	0.16	0.18	0.21	0.25	0.5
0.3	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.05	0.11	0.19	0.27	0.42	0.3
0.2	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.04	0.07	0.13	0.27	0.63	0.2
0.1	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.04	0.06	0.14	1.25	0.1

4.5.13 In free surface calculations the following may be disregarded:

(i) small tanks, where $M_{fs\ 30^o}$ divided by the minimum displacement is smaller than 10 mm; and

(ii) normal small residue in empty tanks.

4.6 Standard conditions of loading

4.6.1 The standard loading conditions referred to in 4.1.2 and 4.4.2(i) should be calculated as follows:

(i) departure for fishing grounds with full fuel, stores, ice, fishing gear, etc.;

(ii) departure from fishing grounds with full catch;

(iii) arrival at home port with full catch and 10 per cent stores, fuel, etc.; and

(iv) arrival at home port with 20 per cent of full catch and 10 per cent stores, fuel, etc.

4.6.2 The calculations of the loading conditions should include the following assumptions:

(i) Allowance for the weight of the wet fishing nets and tackle, etc. on deck;

(ii) allowance for icing, if appropriate, in accordance with 4.7;

(iii) homogeneous distribution of the cargo unless this is inconsistent with practice;

(iv) deck cargo, if anticipated, in loading conditions 4.6.1(ii) and (iii); and

(v) water ballast, only if normally carried in tanks which are specially provided for this purpose.

4.7 Allowances for ice accretion

4.7.1 For vessels intended for operation in sea areas north of latitude 66°30'N, or to the south of latitude 60°00'S, as well as in winter in the Barants, Bering and Okhotst Seas and Tartary Strait, the following minimum weights of ice accretion should be assumed in stability calculations for the worst loading condition:

(i) For exposed weather decks and gangways not less than 30 kg/m^2;

(ii) for projected lateral area of the portion of the vessel above water plane not less than 15 kg/m^2.

4.7.2 In other areas of the winter seasonal zone prescribed in the International Convention on Load Lines, 1966, the assumed standards of icing in winter should be one-half of those given in 4.7.1.

4.7.3 The height of the centre of gravity of ice accretion should be calculated according to position of corresponding parts of the decks and gangways and other continuous surfaces on which ice can accumulate.

4.7.4 The projected lateral area of discontinuous surfaces of rails, spars (except masts) and rigging of vessels having no sails and the projected lateral area of other small objects should be computed by increasing the total projected lateral area of continuous surfaces by 5 per cent and the static moments of this area by 10 per cent.

4.7.5 For vessels operating off the east coast of Canada during the winter months the competent authority should give consideration to more severe requirements.

4.7.6 Vessels intended for operation in areas referred to in this Section should be designed to minimize the accretion of ice.

4.8 De-icing equipment

Vessels intended for operational areas defined in 4.7 should be equipped with de-icing devices and special tools such as axes or wooden clubs for knocking ice from bulwarks, rails and erections.

4.9 Portable fish-hold divisions

The catch should be properly secured against shifting which could cause dangerous heeling of the vessel. Recommended practice on portable fish-hold divisions is given in Annex IV.

Chapter V - Machinery and electrical installations

5.1 General

5.1.1 Boilers, main and auxiliary machinery, oil fuel systems, air compressors and air bottles, electrical systems, piping and pumping arrangements and refrigeration systems should be designed, constructed and installed in accordance with good marine practice invoking, where applicable, the requirements of the competent authority or rules of recognized classification societies as is appropriate. The above machinery and equipment should be so installed, protected and maintained as not to constitute a danger to persons.

5.1.2 Engine rooms should be designed so as to give safe and free access to all parts of the engine which may need attention at sea. In engine rooms passages of sufficient width but not less than 600 mm should be provided between main engines and auxiliary machinery or switchboards.

5.1.3 All controls for operating the machinery and equipment measuring devices, pumping systems and arrangements, valves, cocks, air pipes, inlets, sounders, switches, etc. should be permanently marked with appropriate inscriptions clearly showing their purpose. Pipes should preferably be marked by appropriate colours to indicate their purpose. All handwheels should be marked with pointers showing the direction of turning, which generally should be clockwise for closure.

5.1.4 Steam fittings, steam pipes and exhaust pipes and other hot surfaces within reach of personnel should be properly insulated or otherwise protected to prevent accidents or burns. Likewise, hot surfaces which could cause ignition should be protected from all possible contacts with combustible liquid.

5.1.5 Railings on gratings in the machinery spaces should consist of a handrail and guard rail where practicable; toe boards approximately 60 mm high should be affixed to the edge of all gratings where appropriate.

5.1.6 Openings to machinery space bilges should be properly guarded with handrails and toe boards or gratings.

5.1.7 Engines, electric motors, gearing, chain and belt drives, friction clutches and shafting which can cause injury to personnel should be fenced or protected as far as is practicable without impeding the safe operation of the vessel. Machinery platforms should have adequate handrails or hand-holds.

5.1.8 Floor plates should be properly fitted and secured in place and should have a non-slip surface where practicable.

5.1.9 Machinery space ladders should be fitted with non-slip treads and well maintained. Adequate handrails should be provided.

5.1.10 Spare parts and stores should be provided to the satisfaction of the competent authority. Adequate facilities should be provided for the safe stowage of spare parts and stores.

5.1.11 At least two means of communication should be provided between the wheelhouse and the engine room. Due account of the noise level in the engine room should be taken in selecting and locating these means of communication. However where the main engine is controlled directly from the bridge, at least one such means of communication should be provided.

5.2 Machinery and Boilers

5.2.1 Sufficient astern power should be provided for adequate manoeuvrability of a vessel under all normal operating conditions.

5.2.2 Information on operation and maintenance of machinery and boilers, usage of fuels and lubricating oils should be provided.

5.2.3 Machinery and boilers should be provided with appropriate safety devices to prevent injury to personnel in the event of abnormal operation.

5.2.4 Bars used on flywheels to turn machinery over by hand should be so constructed as to facilitate easy withdrawal from the flywheel's recess if the engine should recoil. Hand cranks for engines should be designed to be thrown out instantly when the engine starts.

5.2.5 Water level indicators, pressure gauges and other measuring devices should be so installed and illuminated as to be readily visible.

5.2.6 Auxiliary boilers operating on oil fuel which are located outside any enclosures on the platforms or 'tween decks should be protected with oil-tight coamings of a height of approximately 200 mm.

5.2.7 When automated machinery is installed the control and alarm instrumentation should be to the satisfaction of the competent authority.

5.3 Oil fuel systems

5.3.1 Oil pipes of internal combustion engines subjected to high pressure and likely to be subjected to vibration, should be of seamless steel or other approved material and should be adequately secured and protected.

5.3.2 Wherever oil might escape and come into contact with hot surfaces, suitable guards or screens should be installed.

5.3.3 Oil storage tanks should not be situated above stairways and ladders, boilers, hot surfaces and electrical equipment. Oil storage tanks and piping should be arranged to minimize the possibility, in the event of overflow leakage or rupture, that fuel will come into contact with hot surfaces or electrical components which may cause ignition of the fuel.

5.3.4 Vent pipes from oil fuel tanks should have a net cross section not less than 1.25 times that of the filling pipes, and should be led from the top of the tank to the open air in a space where no danger will result from overflow or the discharge of oil vapours. The vent pipe outlets should be fitted with U bends (or other protective arrangements) and metal flame screens easily removable for cleaning. The open area of the screens should be not less than the cross section area of the vent pipe.

5.3.5 Sounding arrangements on service oil fuel tanks should be such that in the event of the tanks being overfilled, spillage through the means of sounding cannot occur.

5.3.6 Indicators for fuel and lubricating oil tanks which do not require piercing of the lower parts of those tanks are preferred. Protected gauges having substantial flat glasses and self-closing cocks may be allowed. Tubular gauge glasses should not normally be fitted.

5.3.7 Fuel oil tank soundings should not be located in crew accommodation, but may exceptionally be installed in passageways, in which case flush deck screwed caps should be fitted.

5.3.8 Oil fuel filling stations should be outside the machinery spaces and so arranged that any overflow cannot come into contact with any hot surface where it might be ignited.

5.3.9 Removable oil burners of boilers should be so constructed as to be removable only after the burner's oil fuel valve has been closed. To ensure the correct sequence for turning on and off oil fuel burners of boilers, fuel oil valves and air dampers should be so arranged that fuel oil inlet valves can be opened only after air inlet dampers have been opened, and that in turning off oil burners air inlet dampers can be closed only after fuel oil inlet valves have been secured. Oil fuel filters should be so placed as to minimize the danger of spraying oil

on to hot surfaces and it should not be possible to remove the covers of any such filter until that filter has been properly isolated from the supply.

5.3.10 Emergency controls should be provided for stopping every oil fuel pressure pump and every fan supplying air to the boiler or machinery spaces and for closing all suctions from oil tanks other than double bottom tanks, from readily accessible positions not likely to be cut off in the event of a fire in the boiler or machinery spaces. Preferably these controls should be sited in the open deck or outside the accommodation spaces.

5.3.11 No oil fuel which has a flashpoint of less than 60°C (closed cup test) as determined by an approved flashpoint apparatus should be used as fuel, except in emergency generators, in which case the flashpoint should be not less than 45°C. Provided that the competent authority may permit the general use of fuel oil having a flashpoint of not less than 43°C subject to such additional precautions as it may consider necessary and on condition that the temperature of the space in which such fuel is stored or used should not rise to within 10°C below the flashpoint of the fuel.

5.4 Bilge and ballast systems

5.4.1 Arrangements should be provided for draining any water-tight compartment (other than small buoyancy compartments) under all service conditions to the satisfaction of the competent authority. As an alternative for the compartment forward of the collision bulkhead a portable bilge pump or other equipment may be fitted provided it is capable of discharging leakage water from this compartment.

5.4.2 Valves and cocks not forming part of a piping system should not be permitted in watertight bulkheads.

5.4.3 Bilge suctions should be fitted with suitable strainers having an open area not less than 3 times the area of the bilge pipe.

5.4.4 Bilge and ballast pumping systems should be so arranged as to prevent water passing from the sea or from water ballast spaces into holds or into machinery spaces or from one watertight compartment to another. The bilge connection to any pump which draws from the sea or from water ballast spaces should be either a non-return valve or a cock which cannot be opened at the same time to the bilges and to the sea or to bilges and water ballast spaces. Valves in bilge distribution boxes should be of a non-return type.

5.4.5 A bilge line piercing a collision bulkhead should be fitted with a screw-down valve at the bulkhead with remote control from the weather deck with the appropriate indicator. If the valve is fitted on the after side of the bulkhead and is readily accessible under all service conditions the remote control may be dispensed with.

5.4.6 Not less than two powered bilge pumps should be provided. A ballast pump or other general service pump of sufficient capacity may be used as an independent bilge pump. One of the bilge pumps may be driven from the main engine. However, both pumps should not depend on one source of power only. The capacity of each power driven bilge pump except for oily-water separator pumps should be at least:

$$\frac{L_s(B_s + D_n) + 350}{45} \ (m^3/h)$$

where L_s, B_s and D_n are as defined in 1.2.1(xi) - (xiii).

5.4.7 One of the powered bilge pumps should have direct bilge suction from the compartment where the pump is situated.

5.4.8 The inside diameter of the bilge main and bilge suction pipe directly connected to the pump should be not less than 50 mm, but in all cases it should be not less than the inside diameter of the bilge pump suction inlet.

5.4.9 The largest available power pump in the engine room should be fitted with an emergency bilge suction.

5.4.10 If fuel tanks are used to carry water ballast for ensuring stability or trim of the vessel, reliable devices should be provided for cutting off the ballast system from the tanks containing fuel as well as for cutting off the fuel system from fuel tanks containing water.

5.5 Steam supply and exhaust piping

5.5.1 Copper pipes used in steam supply and exhaust systems should be seamless.

5.5.2 Main and auxiliary steam stop valves should be arranged to seat against boiler pressure.

5.5.3 Steam supply and exhaust pipes should not be led through coal bunkers or dry cargo spaces unless approved by the competent authority in which case they should be substantially encased for protection against mechanical injury. In vessels built of other material than steel, steam supply and exhaust piping should be insulated so that materials adjacent thereto are neither ignited nor rendered ineffective by heat.

5.5.4 Where more than one power boiler is fitted the auxiliary steam piping should be so arranged that steam for whistle, steering gear, and electric lighting plant can be supplied from any power boiler.

5.5.5 Suitable drains should be provided at low points of piping systems.

5.5.6 Steam piping should not be fitted above or in the vicinity of switchboards or other electrical equipment. Where such arrangements are unavoidable, provision should be made to prevent leakage damaging the equipment.

5.5.7 Where positive shutoff valves are fitted in exhaust lines of machinery, and the exhaust lines are not designed for the maximum inlet pressure, relief valves of sufficient capacity should be fitted between machinery exhaust and shutoff valves.

5.5.8 A sentinel relief valve or other warning device fitted on the engine or turbine exhaust may be permitted by the competent authority as a substitute for a relief valve, provided that a back pressure trip device is installed which will close the inlet valve when the exhaust side of the system is subjected to pressure exceeding the maximum allowable working pressure.

5.5.9 Shore steam connections should, where necessary be fitted with reduction and relief valves set at a pressure not exceeding the design pressure of the piping.

5.5.10 Hot water heating systems should be designed as independent systems and approved by the competent authority.

5.6 Electrical installations

5.6.1 Electric circuits should be clearly identified on switchboards. The current carrying capacity of each circuit should be permanently indicated together with the rating or setting of the appropriate overload protection device.

5.6.2 Electrical equipment exposed to the weather should be protected from dampness and corrosion as well as mechanical damage.

5.6.3 (i) (1) All exposed metal parts of electrical machines or equipment which are not intended to be "live" but are liable to become "live" under fault conditions, should be earthed (grounded).

(2) Metal frames of all portable electric lamps, tools and similar apparatus rated in excess of a safety voltage to be prescribed by the competent authority should be earthed (grounded) through a suitable conductor, unless equivalent provisions are made such as by double insulation or by an isolating transformer. The competent authority may require additional special precautions for electric lamps, tools or similar apparatus for use in damp spaces.

(ii) Main and emergency switchboards should be so arranged as to give easy access back and front, without danger to personnel. The sides and backs and, where necessary, the fronts of switchboards should be suitably guarded. There should be non-conducting mats or gratings front and rear where necessary. Exposed current-carrying parts at voltages to earth (ground) exceeding 250 volts DC or 55 volts AC should not be installed on the face of any switchboard or control panel.

(iii) The hull return system of distribution should not be used. However, where permitted by the competent authority, special precautions should be taken.

(iv) (1) All metal sheaths and armour cables should be electrically continuous and should be earthed (grounded).

(2) Where the cables are neither sheathed nor armoured and there might be a risk of fire in the event of an electrical fault, special precautions should be taken to the satisfaction of the competent authority.

(3) Electric cables should be of a flame retarding type except where to the satisfaction of the competent authority they are adequately protected against spread of fire.

(v) Lighting fittings should be arranged to prevent temperature rises that would be injurious to the wiring, and to prevent surrounding material from becoming excessively hot.

(vi) Wiring should be supported in such a manner as to avoid chafing or other damage and should not be located close to hot surfaces such as engine exhausts.

(vii) Each separate circuit should be protected against short circuit. Each separate circuit should also be protected against overload, except that short circuit protection should be provided for motors and circuits of electrically or electro-hydraulically operated main steering gear, but protection against excess current if provided should be not less than twice the full load current of the motor or circuit provided.

The current-carrying capacity of each circuit should be permanently indicated, together with the rating or setting of the appropriate overload protective device.

(viii) Accumulator batteries should be suitably housed. They should not be installed in crew accommodation. Compartments used primarily for their storage should be properly constructed and efficiently ventilated.

5.6.4 Emergency source of power should be provided for such services as the competent authority may require including in any case, illumination at launching stations and stowage positions of survival craft as detailed in 8.8.

5.6.5 Where an explosion risk exists in or near to any space, all electrical equipment in the space and hazardous area should be explosion-proof or an intrinsically safe type to the requirements of the competent authority.

5.6.6 Cable systems and electrical equipment should be so installed as to avoid or reduce interference with radio reception.

5.7 Refrigeration plants

5.7.1 Cold stores and where fitted evaporator rooms should be provided with:

(i) tight fitting doors which can be opened from either side;

(ii) alarms which can be operated from within rooms;

(iii) means for locating the exit door, should lights in rooms be switched off or fail; and

(iv) mechanical means for the extraction of any harmful vapours from evaporator rooms;

but they should have no permanently open vent or channel which would permit the passage of refrigerants to other parts of the vessel.

5.7.2 Methyl chloride should not be used as a refrigerant gas. When the refrigerant gas is either toxic or more dense than air, piping should be run so that leaking gas would not endanger personnel in their accommodation or working spaces. If ammonia

is to be used as the refrigerant gas the refrigerating plant should be at least arranged so as to take account of the recommended practice at Annex V to this Part of the Code. Refrigerating machinery utilizing toxic refrigerants should be separated from any adjacent crew accommodation by a gastight bulkhead. Escape exits from such spaces should not lead directly into crew accommodation. Where toxic refrigerants are used one of the exits should lead to the weather deck.

5.7.3 Where any gas harmful to persons is used in a refrigerating system, at least one remote or self-contained breathing apparatus of a type approved by the competent authority should be placed convenient to the refrigeration plant but not in a position likely to become inaccessible in the event of leakage of gas. Breathing apparatus of an approved type provided as part of the vessel's fire-fighting equipment may be considered as meeting all or part of this provision provided it is suitably placed to meet both purposes. Where self-contained breathing apparatus is provided, additional compressed air cylinders should be provided.

5.7.4 Portable means of detecting the concentration of any leakage of harmful gas should be provided.

5.7.5 Refrigerants should only be drained to open spaces.

5.8 Air Compressors

Air intakes for air compressors should be so located that the air is as pure and clean as possible and free from inflammable or toxic gases or fumes. Air filters should be fitted. Air discharge pipes of compressors should, where necessary, be insulated to protect personnel from burns.

5.9 Fish processing equipment

5.9.1 Arrangement of fish processing equipment should ensure free access for inspection, operation and sanitary treatment of the equipment. Passageways around processing equipment should be not less than 750 mm wide.

5.9.2 Insulations of fish processing equipment should be durable and stable under conditions of vibration and should have reliable fastenings and coatings.

5.9.3 Machinery and installations operating under pressure should comply with requirements of the competent authority.

5.9.4 Machinery and other installations from which vapour, gas or dust may readily escape or be emitted during operation should be fitted with exhaust devices. Suction ends of these devices should be located as near as possible to the source of vapour, gas or dust and the piping should be so arranged that discharged vapours, gases and dust will not pass through spaces where persons are working.

5.9.5 Where several conveyors are working in one line, emergency switches should be provided at intervals of not more than 10 m for stopping all conveyors working in the line. Where the length of the conveyors is 15 m or more sound or light signals should be provided for giving warning when the conveyor starts.

5.9.6 Dampers, cocks, valves and other stopping devices should be positioned so that they are readily accessible and safe for operation.

5.9.7 Mechanisms and equipment in working spaces should be fitted on strong and rigid foundations securely connected to the vessel's structure.

5.9.8 Moving parts of the machines, mechanisms and installations as well as gears which may present a hazard should be guarded.

5.9.9 Machinery and installations which require servicing at a height of more than 2 m should be equipped with platforms of 600 mm in width and guarded with rails not less than 1 m in height.

5.9.10 Fish processing equipment operating with water should be provided with effective drainage systems, having regard to their extra susceptibility to clogging.

5.9.11 Loading and unloading devices for the machinery and other installations should be arranged at a convenient height for operation.

5.9.12 Steam or vapour outlet of liver boilers should be arranged as high as possible. Outlet pipes should be at least 50 mm in diameter and lead into open air. Vapour from outlets should not obscure visibility.

5.9.13 Filling openings of liver and fish oil boilers should be within easy reach of personnel. Lids of filling openings should have suitable means of closing so as to prevent steam or vapour emerging into the space and should be counterbalanced or provided with other safe means of securing in the open position when required.

Chapter VI - Fire Protection, Fire Detection, Fire Extinction and Fire-Fighting Equipment

6.1 General

The following minimum standards should apply. Competent authorities or recognized classification societies should impose higher standards where the materials, construction or size of vessel so warrants.

6.2 Structural fire protection

6.2.1 The hull, superstructure, structural bulkheads, decks, deckhouses and structural components below the weather deck should be constructed of incombustible material. The competent authority may permit combustible construction providing the requirements of 6.2 and the additional fire extinguishing requirements of 6.17.3 are complied with.

6.2.2 Decks and bulkheads separating machinery spaces and control stations from each other and from accommodation and service spaces should be so constructed as to withstand the standard fire test for one half hour for a "B" Class division. In addition macninery space boundaries should preferably prevent the passage of smoke. Doors and other openings in such bulkheads and decks should be constructed so as to preserve the integrity of the divisions.

6.2.3 Bulkheads of corridors serving accommodation spaces service spaces and control stations should extend from deck to deck and they together with the decks should be so constructed as to withstand the standard fire test for one half hour for a "B" Class division. Doors and other openings in such bulkheads and decks should be constructed so as to preserve the integrity of the divisions.

6.2.4 Interior stairways, serving accommodation spaces, service spaces or control stations should be of steel or

other equivalent material. Such stairways should be within enclosures constructed so as to withstand the standard fire test for one half hour for "B" Class divisions.

6.2.5 Doors fitted to stairway enclosures referred to in 6.2.4 and in bulkheads referred to in 6.2.3, including doors which are fitted to engine and boiler casings, should be as far as practicable, equivalent in resisting fire to the divisions in which they are fitted. Doors to machinery and boiler spaces should be self-closing. In vessels of 45 m in length and over stairway enclosure doors should be self-closing and may be provided with hold back arrangements provided such arrangements are of the remote-release - fail-safe type.

6.2.6 Lift trunks should be constructed of steel or equivalent material and should be provided with means of closing which will permit draught and smoke control.

6.2.7 Boundary bulkheads and decks of spaces containing any emergency source of power and bulkheads and decks between galleys, paint rooms, lamp rooms or any store-rooms which contain appreciable quantities of highly flammable materials and accommodation spaces, service spaces or control stations should be constructed so as to withstand the standard fire test for one half hour for "B" Class divisions. Entrance to such spaces should be from the open deck. Highly flammable products should be carried in suitably sealed containers.

6.2.8 Corridor bulkheads, stairway enclosures, linings and ceilings, as well as the necessary grounds, within accommodation spaces, service spaces and control stations should preferably be of incombustible materials, which may be faced with a limited thickness of combustible veneer.

6.2.9 Exposed surfaces within accommodation spaces, service spaces, control stations, corridor and stairway enclosures and the concealed surfaces behind bulkheads, ceilings, panellings and linings in accommodation spaces, service spaces and control stations should have low flame-spread characteristics. Additionally, if combustible construction is employed, all exposed surfaces within accommodation spaces, service spaces and control rooms should have low flame-spread characteristics.

6.2.10 All exposed surfaces of glass reinforced plastic construction should have the final lay-up layer of approved resin having inherent fire retardant properties or be coated with an approved intumescent (fire retardant) paint.

6.2.11 Paints, varnishes and other finishes used on exposed interior surfaces should not be of a nature to offer an undue fire hazard and should not produce large quantities of smoke or other toxic products.

6.2.12 Air spaces enclosed behind ceilings, panellings or linirgs in accommodation rpaces, service spaces and control stations should be suitably divided by close-fitting draught stops.

6.2.13 Pipes conveying oil, other combustible liquids or compressed air should be of steel or be of such construction and material acceptable to the competent authority having regard to the risk of fire.

6.2.14 Materials readily rendered ineffective by heat should not be used for overboard scuppers, sanitary discharges and other hull connections where these are situated in machinery spaces or elsewhere below the freeboard deck.

6.2.15 Skylights to spaces containing main propulsion machinery, oil-fired boilers, or auxiliary internal combustion type machinery should be operable from inside and outside the space. Fitting of windows to these skylights or in casings of such spaces should be discouraged but where permitted by the competent authority they should be of a non-opening type, with wire-reinforced glass and provided with suitable externally applied steel shutters.

6.2.16 Insulating materials in accommodation spaces, service spaces, control stations and machinery spaces should be incombustible. The surface of insulation fitted on the inside of machinery spaces where oil spillage or the emission of oil vapours may arise should be impervious to oil or oil vapours.

6.2.17 Within refrigerated compartments and insulated fishholds, combustible insulation should be protected by close-fitting cladding, preferably of incombustible material.

6.3 Ventilation Systems

6.3.1 It should be possible to stop fans and close main openings to ventilation systems from a position outside the spaces served.

6.3.2 Means should be provided for closing from a safe position the annular spaces around funnels.

6.3.3 Ventilation openings may be permitted in corridor bulkheads in the lower part of doors, but should not be fitted in doors or bulkheads of stairway enclosures. Ventilation grills should be of incombustible material and should be capable of being closed from the corridor.

6.3.4 Ventilation ducts for main machinery spaces should not in general pass through accommodation spaces, service spaces or control stations except that the competent

authority may so permit provided that the ducts are constructed of steel and arranged to preserve the integrity of the division.

6.3.5 Ventilation ducts of accommodation spaces, service spaces or control stations should not in general pass through main machinery spaces except that the competent authority may so permit provided that the ducts are constructed of steel and arranged to preserve the integrity of the division.

6.3.6 Store-rooms referred to in 6.2.7 and 6.7.2 to 6.7.5 containing appreciable quantities of highly flammable products should be provided with ventilation arrangements which are separate to other ventilation systems. Ventilation should be arranged at high and low levels and the inlets and outlets of ventilators should be positioned in safe areas and fitted with spark arresters.

6.3.7 Ventilation systems serving machinery spaces should be independent of systems serving other spaces.

6.4 Means of Escape

6.4.1 From all crew spaces and other spaces to which the crew normally have access, stairways, ladders and corridors should be arranged so as to provide ready means of escape to a deck or decks from which embarkation into survival craft may be effected.

6.4.2 At least two means of escape should be provided from all accommodation and service spaces. Primary means of escape from accommodation and service spaces below the open deck should preferably be arranged so that it is possible to reach the open deck without passing through intervening spaces containing a possible source of fire. The secondary means of escape may be through adequately sized portholes

or hatches protected where necessary against icing and preferably leading directly to the open deck. Where any part of the crew accommodation is located below an enclosed deck, this secondary means of escape should be of a completely enclosed type. Exceptionally the competent authority may dispense with the second means of escape having in mind the limited number of crew and size of space. Dead end corridors should be avoided but should in no case be longer than 2.5 m in vessels of less than 45 m in length and not more than 5 m in vessels of 45 m in length and over.

6.4 3 Except where the smallness of the engine room makes it impracticable at least two means of escape should be provided by steel ladders from main machinery spaces, and should be as widely separated as possible. It is preferable particularly in vessels of 60 m in length and over for the second of these ladders to provide continuous fire shelter from the lower part of the space to a safe position outside the space, unless a steel door capable of being operated from each side provides a safe escape route from the lower part of the space to the embarkation deck.

6.4.4 Lifts should not be considered as a means of escape.

6.5 Heating installations

6.5.1 Electric radiators, if used, should be fixed in position and so constructed as to reduce fire risks to a minimum. No such radiator should be fitted with an element so exposed that clothing, curtains or other similar materials can be scorched or set on fire by heat from the element.

6.5.2 Heating stoves and other similar appliances should be firmly secured and adequate protection and insulation against fire should be provided beneath and around such

appliances and in way of their uptakes. Uptakes of stoves which burn solid fuel should be so arranged and designed as to minimize the possibility of becoming blocked by combustion products and should have a ready means for cleaning. Dampers for limiting draughts in uptakes should, when in the closed position, still leave an adequate area open. Spaces in which stoves are installed should be provided with ventilators of sufficient area to provide adequate combustion - air for the stove. Such ventilators should not incorporate means of closing.

6.5.3 Open flame gas appliances, except cooking stoves, should not be allowed. However, where such stoves are used, the spaces containing such stoves should have adequate ventilation to remove fumes and possible gas leakage to a safe place. All pipes conveying gas from container to stove should be of steel or equivalent material. Automatic safety gas shut-off devices should be fitted to operate on loss of pressure in the gas main pipe and flame failure on any appliances.

6.6 Automatic fire detection and fire alarm systems

A system of automatic fire detection and fire alarm to indicate the presence and location of fire should be installed in main machinery spaces which are not continuously manned and in other unattended machinery spaces which present a fire hazard.

6.7 Storage of gas cylinders and other dangerous materials

6.7.1 Cylinders for compressed, liquefied or dissolved gases should be clearly marked by means of prescribed identifying colours, have a clearly legible identification of the name and chemical formula for their contents and be properly secured.

6.7.2 Cylinders containing flammable or other dangerous gases and expended cylinders should be stowed, properly secured, on open decks and all valves, pressure regulators and pipes leading from such cylinders should be protected against damage. Cylinders should be protected against excessive variations in temperature, direct rays of the sun, and accumulation of snow. However, the competent authority may permit such cylinders to be stowed in compartments complying with the requirements of 6.7.3 to 6.7.5.

6.7.3 Highly flammable liquids, such as volatile paints, paraffin, benzole, etc. and, where permitted, liquefied gas, should be stored in incombustible compartments having direct access from open decks. Pressure adjusting devices and relief valves, if any, should exhaust within the compartment. Where boundary bulkheads of such compartments adjoin other enclosed spaces they should be gastight and insulated in accordance with the provisions of 6.2.7. Ventilation should be in accordance with the provisions of 6.3.3.

6.7.4 Except as necessary for service within the space, electrical wiring and fittings should not be permitted within compartments containing highly flammable liquids or liquefied gases. Where such electrical fittings are installed they should be suitable for use in a flammable atmosphere. Sources of heat should be kept clear of such spaces and "No Smoking" and "No Naked Light" notices should be displayed in a prominent position.

6.7.5 Separate stowage should be provided for each compressed gas. Compartments containing such gases should not be used for stowage of other combustible products nor for tools or objects not belonging to the gas distribution system.

6.8 Main fire pumps

6.8.1 Minimum number and type of fire pumps to be fitted should be determined in relation to the length of vessels as follows:

(i) in vessels of less than 45 m in length:

(1) one independent power pump, or

(2) one power pump driven by main machinery, and one hand pump;

(ii) in vessels of 45 m in length and over but less than 60 m in length: one independent power pump;

(iii) in vessels of 60 m in length and over: two independent power pumps.

6.8.2 Independent power pumps should not depend upon the main machinery for their motive power.

6.8.3 Power pumps driven by the main propulsion machinery may only be used as fire pumps if the main machinery can be readily disconnected from the propeller shafting, unless a controllable pitch propeller is fitted.

6.8.4 Where hand pumps are fitted in accordance with 6.8.1(i)(2) the pump, sea suction valve and suction piping should be located outside the machinery spaces.

6.8.5 Sanitary, bilge, ballast, general service or any other pumps may be used as fire pumps if they comply with the requirements of this chapter and do not affect the ability to cope with pumping of the bilges. Fire pumps should be so connected that they cannot be used for pumping oil or other flammable liquids.

6.8.6 Centrifugal pumps or other pumps connected to the fire main through which backflow could occur should be fitted with non-return valves.

6.9 Emergency fire pumps

6.9.1 In vessels of 60 m in length and over, where a fire in any one compartment would put out of action the power pumps required in 6.8.1, an emergency power operated fire pump should be fitted.

6.9.2 In vessels of less than 60 m in length an emergency hand operated fire pump which may be the hand pump referred to in 6.8.1(i)(2) should be provided where a power operated emergency pump is not fitted.

6.9.3 Emergency power operated fire pumps should be independently driven self-contained pumps either with their own prime mover and fuel supply fitted in an accessible position outside the compartment which contains the main fire pumps, or be driven by a self-contained generator which may be the emergency generator of sufficient capacity and which is positioned in a safe place outside the engine room and preferably above the freeboard deck.

6.9.4 For any emergency fire pump, the pump, sea-suction valves and other necessary valves should be operable from outside compartments containing main fire pumps in a position not likely to be cut off by a fire in that compartment.

6.10 Fire pump capacities

6.10.1 The minimum total capacity of main power operated fire pumps should be determined as follows:

$$Q = 0.008\ (1.68\sqrt{L_s(B_s + D_m)} + 25)^2$$

Where: Q = pump capacity in m^3/h

L_s, B_s, D_m, in m, as defined in 1.2.1(xi) to (xiii).

6.10.2 Where two independent power pumps are required, the capacity of each pump should not be less than 40 per cent of the quantity required in 6.10.1.

6.10.3 Where main power fire pumps are delivering the quantity of water required in 6.10.1 through the fire main, fire hoses and nozzles, the pressure maintained at any hydrant should be not less than 2.6 kg/cm^2.

6.10.4 Where power operated emergency fire pumps are delivering the maximum quantity of water through the minimum number of jets required in 6.13.1 a pressure of 2.6 kg/cm^2 should be maintained at any hydrant.

6.10.5 Where hand pumps are fitted in accordance with 6.8.1(i)(2) the diameter of the nozzle should be at least 10 mm and the jet should have a throw of at least 6 m.

6.11 Fire mains

6.11.1 Where more than one hydrant is required to provide the number of jets specified in 6.13.1 a fire main should be provided.

6.11.2 Materials readily rendered ineffective by heat should not be used for fire mains, unless adequately protected.

6.11.3 Where fire pump delivery pressure can exceed the designed working pressure of fire mains, relief valves should be fitted.

6.11.4 Fire mains should have no connexions other than those required for fire fighting and washing down.

6.11.5 Where fire mains are not self-draining, suitable drain cocks should be fitted where frost damage may be expected.

6.12 International shore connection

Vessels of 60 m in length and over should have an International Shore Connection, which should comply with Regulation 56(h) of Chapter II of the 1960 Convention.

6.13 Fire hydrants

6.13.1 Fire hydrants should be positioned so as to allow easy and quick connection of fire hoses and so that:

(i) in vessels of less than 45 m in length one jet, and

(ii) in vessels of 45 m in length and over two jets simultaneously,

can be directed into any part of the vessel which is normally accessible during navigation. If only a single hydrant is provided it should not be so positioned as to be inaccessible in event of fire in enclosed spaces.

6.13.2 One jet, as required in 6.13.1, should be from a single hose length, and where two jets are required, the second jet should be from a separate hydrant using not more than two hose lengths coupled together.

6.13.3 Each engine and boiler room in all vessels should be protected with at least one hydrant located near the entrance and in vessels of 60 m in length and over at least one additional hydrant within the space. Each hydrant within the space should be complete with hose and spray/jet nozzle.

6.14 Fire hoses and hose couplings

6.14.1 For every required fire hydrant there should be one hose with couplings and nozzle. At least one spare hose should be provided in addition to this requirement.

6.14.2 Single lengths of fire hose should not exceed 20 m.

6.14.3 Fire hoses should be made from suitable rot-proofed material, e.g. closely woven flax canvas. Each hose should be provided with couplings and a spray/jet nozzle.

6.14.4 Except where hoses are permanently attached to the fire main hose couplings and nozzles should be completely interchangeable.

6.14.5 Where power operated pumps are required under 6.8.1 the nozzles as required under 6.14.3 should be appropriate to the delivery capacity of the pumps fitted, but in any case with a diameter of not less than 12 mm.

6.15 Portable fire extinguishers

6.15.1 A sufficient number of portable fire extinguishers should be provided to ensure that at least one extinguisher is readily available for use in any part of accommodation service spaces and control stations.

6.15.2 Within accommodation, service spaces and control stations vessels of less than 45 m in length should be provided with at least three extinguishers and vessels of 45 m in length and over should be provided with at least five.

6.15.3 One additional extinguisher should be provided for an oil-fired central heating stove.

6.15.4 Fire extinguishers containing an extinguishing medium which, in the opinion of the competent authority, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger personnel should not be permitted.

6.15.5 In general the following equivalent minimum sizes of portable fire extinguishers is suggested:

(i) 9 litres of fluid, or
(ii) 4 kg CO_2, or
(iii) 6 kg dry powder

The equivalent sizes of larger extinguishers should be determined accordingly.

6.16 Fire extinguishing installations in boiler rooms

6.16.1 In vessels of 45 m in length and over, where main or auxiliary oil-fired boilers are situated, or in spaces containing oil fuel units or settling tanks, at least one of the following fixed fire extinguishing installations should be provided, to the satisfaction of the competent authority:

(i) one pressure water spraying installation, or
(ii) one fire smothering gas installation, or
(iii) one fire extinguishing installation using vapours from low toxicity vapourising liquids e.g. bromochlorodifluoromethane (BCF) or bromotrifluoromethane (BTM), or
(iv) one froth fire extinguishing installation, or
(v) one fire extinguishing installation using high expansion froth.

Fire extinguishing installations using an extinguishing medium which, in the opinion of the competent authority, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger personnel should not be permitted.

6.16.2 Installations listed in 6.16.1 should be controlled from readily accessible positions outside boiler rooms not likely to be cut off by a fire in the protected space. Arrangements should be made to ensure the supply of power and water necessary for the operation of the system in the event of fire in the protected space.

6.16.3 Two portable fire extinguishers of 9 litres of fluid or equivalent according to 6.15.5 suitable for fighting oil fires, plus one extinguisher for every burner should be provided. The total number of extinguishers need however not exceed seven. A semi-portable extinguisher of 45 litres capacity may be substituted for the portable extinguishers provided that the number of portable extinguishers is not less than two.

6.17 Fire extinguishing installations in engine rooms

6.17.1 Engine and boiler rooms not entirely separated from each other should be treated as one combined space for the purposes of 6.16.1.

6.17.2 Where internal combustion type engines are used, either for main propulsion machinery, or for auxiliary purposes associated with a total power not less than 1,000 BHP a vessel of 45 m in length and over should be provided with:

(i) one of the fixed arrangements required by 6.16.1;

(ii) in each engine space, one approved froth type extinguisher of not less than 45 litres capacity or equivalent and also one approved portable froth extinguisher for each 1,000 BHP of the engines or part thereof; but the total number of portable extinguishers so supplied should be not less than two and need not exceed six.

6.17.3 Vessels constructed mainly or wholly of wood or glass reinforced plastic, and fitted with oil-fired boilers or internal combustion machinery and decked in way of the machinery space, should be provided with one of the extinguishing systems required in 6.16.1. Drip trays should be fitted where necessary to prevent oil leaking into bilges.

6.17.4 All vessels having machinery spaces not protected by a fixed fire extinguishing system should be provided with at least a 45 litre froth extinguisher, or its equivalent **suitable for fighting oil fires.**

6.17.5 A sufficient number of portable extinguishers suitable for extinguishing oil fires should be provided in the engine room. There should be at least the following number of extinguishers in the engine room, as listed below:

Power of propulsion machinery:	Number of extinguishers:
Less than 160 BHP	1
160 BHP or more but less than 300 BHP	2
300 BHP or more	3

One extinguisher should be located near the entrance.

6.18 Fire-fighting equipment

6.18.1 Vessels of 45 m in length and over should be provided with two fireman's outfits.

6.18.2 Each fireman's outfit should comply with Regulation 63 of Chapter II of the 1960 Convention (Resolution A.108(ES.III)).

6.18.3 Each vessel should have at least one fireman's axe.

6.19 Housekeeping

6.19.1 Containers for oily rags should be provided in the machinery space. Such containers should be constructed of steel and have tight-fitting, self-closing steel covers.

6.19.2 The competent authority should communicate by the best available means, such as the IMCO Fire Fighting Booklet (MSC/Circ.62, 28.5.1969), the importance of keeping vessels clean and free of combustible debris.

Chapter VII - Protection of the crew

7.1 General protective measures

7.1.1 An adequate number of lifelines, safety belts, bosun's chairs and stages should be provided.

7.1.2 A lifeline system should be designed to be effective for all needs and the necessary wires, ropes, shackles, eye bolts and cleats should be provided.

7.1.3 Where there is a danger of personnel falling through deck openings the sills should have suitable height or suitable guards should be provided.

7.1.4 Where there is a danger of personnel falling through skylights, or other similar openings, such openings should be fitted with protective bars not more than 350 mm apart.

7.1.5 The surface of decks throughout a vessel should be specially designed or treated to minimize the possibility of personnel slipping. In particular, the decks and working spaces on board, such as machinery spaces, galleys and fish-handling and winch areas as well as deck areas at the foot and head of ladders and just outside the doors, should be specially prepared or designed as anti-skid surfaces.

7.2 Deck openings

7.2.1 Hinged covers of hatchways, manholes and other openings should be protected against accidental closing. In particular, heavy covers on escape hatches should be equipped with counter-weights.

7.2.2 Dimensions of access hatches should not be less than 600 mm by 600 mm.

7.2.3 Hand holds should be provided above the level of the deck over escape openings.

7.3 Stairways and ladders

7.3.1 Stairways and ladders should be provided for safe working at sea and in port. They should be of adequate size

and strength. Means of access to holds, 'tween decks, bunkers and similar parts of a vessel should consist of fixed ladders or stairs.

7.3.2 Stairways of more than 1.0 m in height should have handrails on both sides.

7.3.3 Treads of stairways should be flat and specially prepared to minimize slipping.

7.3.4 Fixed vertical ladders should be so situated as to be protected from damage and should be so fitted as to provide clearance of 150 mm behind. The rungs of steel vertical ladders should be made of square section steel bars with the sharp edge upwards. Where ladders are constructed with stringers, the rungs should pass through the stringers. Handholds should be provided where rungs or stringers are not suitable for this purpose.

7.3.5 Rope ladders should comply with the recommended standards for pilot ladders (reproduced at Annex IX).

7.3.6 Emergency escape ladders should normally be fixed but may be portable provided that they are stowed adjacent to the escape and that they can be secured in place when required without tools or mechanical aids.

7.3.7 Ladders in machinery and boiler spaces should preferably be at least 450 mm wide.

7.4 Accommodation ladders and gangways

7.4.1 Where reasonable and practicable an accommodation ladder, gangway or similar appliance should be provided to ensure sufficient safe and suitable access to the vessel.

7.4.2 If an accommodation ladder or gangway is not practicable, a substantial straight ladder, of adequate length and extending at least 900 mm above the upper landing suface, should be provided. Where conditions are such that a ladder cannot be used, a pilot ladder meeting the provisions of Annex VIII should be provided.

7.4.3 Accommodation ladders and gangways should be of reliable material, good construction and adequate strength, and be securely installed.

7.4.4. Accommodation ladders and gangways should be at least 550 mm wide and be fitted with railings at least 1.0 m high measured perpendicularly to the appliance on both sides, consisting of two rails or taut ropes, wires or chains about 500 mm apart and supported by stanchions not more than 2 m apart which should be designed to be secured against inadvertent dislodgment.

7.4.5 Accommodation ladders should be provided with hooks or other suitable fastenings for adequate support and securing against displacement or slipping and be able to be adjusted to the height of the landing place.

7.4.6 When a fixed tread accommodation ladder is fitted, cleated duck boards should be provided which can be secured over the front edges of ladder steps to form a gangway when the ladder angle is low enough to require this for safety.

7.4.7 Gangways should be fitted with cleats (transverse treads) at suitable stepping intervals and for the full width of the gangway.

7.4.8 Turntables of gangways which pivot or swivel horizontally on a platform should be adequately protected by railings or ropes.

7.4.9 The lower end of accommodation ladders or gangways should have suitable angle plates or guards to cover wheels or rollers and to serve as a runway to the landing surface.

7.4.10 Where the upper ends of the means of access rest on the top of the bulwark, steps equipped with at least one handrail of 900 mm in height should be provided which can be secured between the top of the bulwark and the vessel's deck.

7.5 Galleys

7.5.1 Adequate grab rails should be fitted.

7.5.2 Dangerous parts of food-processing machinery should be fitted with permanent safety guards.

7.5.3 Cooking stoves should be fitted with guards to retain cooking utensils.

7.6 Winches, tackle and lifting gear

7.6.1 Moving parts of winches and of warp and chain leads which may present a hazard should be as far as practicable adequately guarded or fenced.

7.6.2 Controls of winches should be so placed that winch drivers have ample room for their unimpeded operation and have as unobstructed a view as possible of the working area. Where practicable, control handles should be arranged to return to the stop position when released and be provided, where necessary, with a suitable locking device to prevent accidental movements or displacement or unauthorized use.

7.6.3 Winches should be provided with means to prevent overhoisting and to prevent the accidental release of a load if power supply fails. Where practicable extra winches with wire storage drums should be fitted to avoid the need to provide whipping drums.

7.6.4 Winches should be equipped with brakes capable of effectively arresting and holding the safe working load. The brakes should be proof-tested with static load before installation suitably in excess of the maximum safe working load to the satisfaction of the competent authority, if necessary to prevent danger, the brakes should be provided with a locking device. Brakes should be provided with simple and easily accessible means of adjustment. Every winch

drum which could be uncoupled from the drive should be furnished with a separate brake independent of the brake connected with the drive.

7.6.5 Where manually operated "guiding on" gear is installed the operating wheels should be without open spokes or protrusions that could cause injury to the operator and should be capable of being disengaged when the warps are paying out. Preferably the "guiding on" gear should be capable of being disengaged when the warps are paying out.

7.6.6 Where practicable, winches should be reversible.

7.6.7 Winch barrels should be provided with means for fastening wire ends, for instance clamps, shackles or other equally effective method which should be so designed as to prevent kinking of the wires.

7.6.8 Warp guards should be fitted where practicable between warp lead rollers.

7.6.9 Sheaves should be guarded where practicable.

7.6.10 Where practicable, provision should be made to stop trawl boards swinging inboard, such as the fitting of a portable prevention bar at the gallows aperture, or other equally effective means.

7.6.11 Chains or other suitable devices should be provided for "stoppering off".

7.6.12 Lifting and running parts of the fishing gear should be of adequate strength for the anticipated loads.

7.6.13 Wires and warps provided should be of adequate strength for the anticipated loads.

7.6.14 Lifting and hoisting appliances and similar equipment including all parts and working gear thereof, whether fixed or movable, and all plant should be of good construction, reliable

material, adequate strength and free from patent defect. They should be adequately and suitably anchored, supported or suspended having regard to the purpose for which they are used and should be marked with the safe working load. They should have easy access for maintenance.

7.6.15 No such appliance of a kind referred to in 7.6.14 nor any part or working gear thereof, should be taken into use for the first time or after it has undergone any substantial repair unless it has been tested.

7.6.16 Interrelated arrangement of winches and fishing gear should provide safe and convenient operation to the satisfaction of the competent authority.

7.6.17 Where a fishing winch is controlled from the bridge, an emergency switch at the winch should be provided. Where a second control at the winch is required by the competent authority, the arrangement should be such as to make simultaneous control from both control positions impossible, as well as to show which control position is in operation. Where necessary emergency switches for winches should be provided remote from the winch to protect fishermen working in places which are dangerous for operation of warps and trawl boards. Where a fishing winch is controlled from the bridge, the arrangements should be such that the operator has a clear view of the winch and adjacent area.

7.6.18 The design and construction of winches should be such that the maximum effort necessary for operating handwheels, handles, crank handles, levers, etc., should not exceed 16 kg and in the case of pedals not exceed 32 kg.

7.7 Lighting in working spaces

7.7.1 Adequate artificial lighting should be provided on or below deck in all working spaces and passageways, for use when natural lighting is inadequate. Particular attention should be paid to Rules 1(b) and 9(g) of the Regulations for Preventing Collisions at Sea, 1960*.

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* Or Rule 20(b) of the International Regulations for Preventing Collisions at Sea, 1972.

7.7.2 Glare, dazzle or sudden contrasts of illumination should be eliminated as far as is possible.

7.7.3 Provision should be made for some form of emergency lighting which is independent of the normal supply.

7.7.4 Portable lights should be provided as necessary and fitted with heavy duty cables, bulb guards and lanyards.

7.7.5 Where necessary to prevent danger, electric lamps should be protected by guards.

7.8 Ventilation in working and storage spaces

Enclosed working spaces, machinery spaces and spaces used for storage, in particular of paints, oils, solvents and wet batteries, should be adequately ventilated.

7.9 Danger areas

7.9.1 Dangerous spaces or entrances thereto should be properly illuminated and have warning signs prominently posted. A notice should also be posted if a first aid procedure is appropriate.

7.9.2 A notice should be prominently displayed below radar and radio aerials warning of danger, with an instruction that the authority of a responsible officer should be obtained before work is done in the vicinity. A notice should also be prominently displayed at or near the operating controls of radar and radio equipment warning that before starting up the equipment it should be ascertained that no one is working aloft near the aerials.

7.10 Medicine chest

7.10.1 First aid equipment and instructions as required by the competent authorities should be provided in all fishing vessels. International standards relating to first aid at sea laid down in the International Medical Guide for Ships, 1967, prepared by the International Labour Organisation, the Inter-Governmental Maritime Consultative Organization and the World Health Organization, may serve as a guide.

7.10.2 The recommended contents of the medicine chests of categories 1, 2 and 3 fishing vessels, based on an extract from the International Medical Guide for Ships concerning the ship's medicine chest, is given in Annex VI of this Part of the Code.

7.11 Miscellaneous

7.11.1 Protective clothing and safety working equipment such as gloves, goggles, ear protectors, respirators, safety helmets, special footwear, oilskins, explosive gas and oxygen sufficiency indicators, etc. should be provided as required to prevent injury or illness to personnel. Protective clothing, and in particular oilskin clothing, should have a highly visible colour.

7.11.2 Poundboards should be so constructed that they can be locked in position when in use and should not hamper the discharge of shipped water.

7.11.3 Only toughened safety glass or its equivalent should be used for wheelhouse windows.

7.11.4 Effective lightning protectors should be provided. In vessels built of steel, it is sufficient to fit spikes on steel masts.

7.11.5 In designing and installing new machinery and equipment in fishing vessels, special attention should be given to noise limitation.

Chapter VIII - Life-saving appliances

8.1 Survival craft

8.1.1 Number, type and equipment of survival craft should comply with the requirements of the competent authority, taking into account the number of persons on board and area of operation. At least two survival craft should be provided. At least one of these should be suitable for use as a rescue craft if the vessel is not equipped with a special rescue craft. Such rescue craft should be capable of being easily and quickly launched by a minimum number of crew members, easily propelled and highly manoeuvrable and adequate for rescuing a man overboard.

8.1.2 Sufficient lifeboats, or other craft approved by the competent authority as being equivalent to such lifeboats, and/or liferafts should be provided and be available on board at all times and should be properly constructed and equipped so as to meet the requirements of the competent authority. They should have an aggregate capacity to accommodate:

(i) At least twice the total number of persons on board in the case of categories 1 and 2.

(ii) At least one and a half times the total number of persons on board in the case of category 3.

For the purposes of this section, permanently inflated rubber boats of strong abrasion resistant construction with subdivision to the satisfaction of the competent authority may be accepted as "other craft".

8.1.3 Lifeboats and equivalent craft, and liferafts should be clearly and permanently marked as follows:

(i) on lifeboats, their dimensions, number of persons they are permitted to carry and on each side of the bow the name and the port of registry of the vessel;

(ii) on inflatable liferafts and their valises or containers, number of persons they are permitted to carry as well as the serial number and manufacturer's name;

(iii) on rigid liferafts number of persons they are permitted to carry and the name and the port of registry of the vessel.

8.2 Equipment for survival craft

8.2.1 The equipment for survival craft on fishing vessels should be to the satisfaction of the competent authority, having regard to the requirements for a liferaft in Regulation 17 of Chapter III of the 1960 Convention, as a minimum requirement.

8.2.2 When lifeboats built in accordance with Chapter III of the 1960 Convention are carried, the equipment list should also conform to Regulation 11 of that Chapter.

8.2.3 All items of a survival craft's equipment should be secured within the craft in a manner so as not to interfere with the lifting hooks and not to prevent ready embarkation.

8.3 Abandon ship procedures

Adequate arrangements should be provided for warning the crew that the vessel is about to be abandoned.

8.4 Stowage of survival craft

8.4.1 Survival craft should be stowed to the satisfaction of the competent authority, in such a way that:

(i) they can be launched in the shortest possible time;

(ii) their safe launching is ensured having particular regard to clearance from the propeller(s); and

(iii) they will not impede prompt handling of any of the other survival craft or marshalling of persons at launching or embarkation stations.

8.4.2 Launching devices should be of a type approved by the competent authority. Davits, falls and other gear should be of such strength that the survival craft can be turned out manned by a launching crew and safely lowered with, if required by the competent authority, a full complement of persons and equipment.

8.4.3 As a guide, Regulations 29 and 36 of Chapter III of the 1960 Convention are recommended.

8.5 Embarkation arrangements of survival craft

Suitable arrangements should be made for the embarkation into the survival craft, which should include where the height of the vessel makes it necessary:

(i) a ladder at each set of davits or at least one ladder on each side of the vessel:

(ii) means for preventing any discharge of water into the survival craft at fixed launching positions.

8.6 Lifebuoys and life-jackets

8.6.1 Number and type of lifebuoys and life-jackets, taking into account the number of persons on board and area of operation should comply with the requirements of the competent authority. The number of life-jackets should not be less than the number of persons on board. Life-jackets should comply with the provisions of the Recommendation for Testing Life-jackets reproduced at Annex VII of this Part of the Code.

8.6.2 Lifebuoys should be so placed as to be readily accessible. Two lifebuoys should be stowed on the wings of the bridge with self-igniting lights attached. When practicable these lifebuoys should be capable of quick release. Two lifebuoys should be fitted each with a buoyant lifeline of at least 27.5 m in length and should be stowed

on deck. In ports, one lifebuoy with a buoyant lifeline of at least 27.5 m in length should be stowed close to the accommodation ladder or gangway position. In addition, one self-activated smoke signal should be attached to each of the lifebuoys on the bridge for daylight marking.

8.7 Line-throwing appliances

For vessels of categories 1 and 2 a line-throwing appliance of a type approved by the competent authority should be provided, being capable of carrying with reasonable accuracy a line not less than 230 m in length.

8.8 Emergency lighting

8.8.1 Lighting of alleyways, stairways and exits should be provided to the satisfaction of the competent authority to ensure that access to launching stations and stowage positions of survival craft is not impeded. Means should be provided for illuminating the survival craft and their launching gear during preparation for and the process of launching, and also for illuminating the water into which the survival craft are launched until the process of launching is completed.

8.8.2 Such lighting should be capable of being supplied for at least three hours by an emergency source of power located to the satisfaction of the competent authority. Where practicable it is recommended that the emergency source of power should be located outside the machinery space above the freeboard deck. Such source of power may be either:

(i) an accumulator (storage) battery capable of carrying the emergency load without recharging or excessive voltage drop; or

(ii) a generator, driven by a suitable prime mover with an independent fuel supply and with starting arrangements to the satisfaction of the competent authority. The fuel used should have a flash point not less than 43°C.

In vessels of less than 45 m in length an alternative means of emergency lighting which is acceptable to the competent authority may be fitted.

8.8.3 Arrangements should be such that the complete emergency installation will function when the vessel is inclined to $22\frac{1}{2}^{\circ}$ and/or when the trim of the vessel is 10°.

8.8.4 Provision should be made for the periodic testing of the complete emergency installation.

8.9 Distress signals

Means of making effective distress signals by day and by night should be provided to the satisfaction of the competent authority having regard to the category of vessel and service in which it is engaged.

Chapter IX - Radiotelegraphy and radiotelephony

9.1 General

Radiotelegraphy and radiotelephony requirements should take account of the relevant parts of Recommendation 2 of the International Conference on Safety of Life at Sea, 1960, and should comply, to the greatest possible extent, with Chapter IV of the 1960 Convention, as amended.

9.2 Provisions of fixed radio equipment

9.2.1 Vessels of categories 1 and 2 should be fitted with radiotelegraphy or radiotelephony conforming as nearly as practicable with the relevant provisions contained in Chapter IV of the 1960 Convention, as amended. For voyages beyond normal radiotelephony cover of coastal radio stations, radiotelegraphy equipment should be carried.

9.2.2 Vessels of category 3 if not equipped with radiotelegraphy should be fitted with radiotelephone conforming as nearly as practicable with the relevant provisions of Chapter IV of the 1960 Convention, as amended. Vessels of category 3, if always within VHF cover of land stations, may carry a VHF installation instead.

9.2.3 Whenever a vessel carries radiotelephony, a card of instructions as prescribed in Regulation 14(f) of Chapter IV of the 1960 Convention, as amended, should be provided.

9.3 Provision of portable radio equipment

Vessels of categories 1, 2 and 3 as appropriate should carry either portable radio transmitter/receivers, capable of transmission and reception at least on the frequency 2182 kHz and incorporating the two-tone alarm signal generating device; or an emergency position-indicating radio beacon (EPIRB).

9.4 Provision of additional equipment

Taking full account of the operational circumstances, the competent authority, in addition to the requirements set out in 9.2 and 9.3 above, should give consideration to the carriage of:

(i) a radio direction finder capable of homing on the radiotelephony distress frequency of 2182 kHz;

(ii) a watch receiver for the 2182 kHz frequency, and

(iii) an emergency position-indicating radio beacon (EPIRB).

Chapter X - Shipborne navigational equipment

10.1 Nautical equipment

10.1.1 Two magnetic compasses should be installed on vessels of categories 1 and 2. A spare magnetic compass bowl which is interchangeable with the standard compass should be carried. At least one magnetic compass should be carried by vessels of category 3. Where a standard compass is fitted which cannot be used as a steering compass, the second compass should be fitted at the main steering position. Magnetic compasses should be properly compensated and a list of curve of residual deviations should be kept on board. Vessels intended for operation at high latitudes should be fitted with a gyro-compass. In any case when a vessel is equipped with the gyro-compass it might not be required to carry the second magnetic compass. Concerning the positioning of magnetic compasses, guidance can be found in ISO Recommendation No.694.

10.1.2 It should be possible to read the compasses by day and by night. It should also be possible to take bearings by day or by night using the standard or steering compass or a pelorus. Magnetic compasses should be provided with means for adjustment, screws or bolts used for securing them or their stands should be made of non-magnetic materials. Compasses should be sited as near the fore-and-aft line of the vessel as practicable with its lubber line, as accurately as possible, parallel with the fore-and-aft line. Compasses should comply with the requirements of the competent authority.

10.1.3 In vessels equipped with an auto-pilot system actuated by a magnetic compass, there should be installed another magnetic compass so positioned that the course of both compasses might be read from the main steering position.

In vessels equipped with a gyro-compass, the course of the standard magnetic compass should be readable from the main steering position. To comply with the requirement that magnetic compasses should be properly compensated, all magnetic compasses should be placed in a binnacle of such size that vertical and horizontal magnetic fields can be compensated. Auto-pilot systems should comply with the requirements of the competent authority.

10.1.4 A mechanical sounding device or an echo sounding device suitable for navigational purposes should be provided.

10.1.5 Vessels of categories 1 and 2 should carry radar.

10.1.6 Where shipborne electronic aids to navigation such as radar, radio direction-finders (RDF), echo-sounders gyro-compasses etc. are carried, they should, as far as it is practicable, correspond to the recommended performance standards reproduced at Annex VIII to this Part of the Code.

10.2 Nautical instruments and publications

The nautical instruments and publications of any of the following types should be provided as considered necessary by the competent authority for the navigational conditions for which the vessels are intended:

(i) barometers, thermometers, sextants, chronometers, anemometers, binoculars and chart instruments;

(ii) up-to-date charts, sailing directions, list of lights, tide tables, nautical almanacs, the International Code of Signals, Merchant Ship Search and Rescue Manual (MERSAR) and other nautical publications as necessary;

(iii) Lists of radio signals and radio stations where radiotelegraphy or radiotelephony is installed;

(iv) charts issued specifically for use with electronic position-finding aids where such aids are installed.

10.3 Lights, shapes and signals

10.3.1 Attention is drawn to the need to comply with the requirements of the Regulations for Preventing Collisions at Sea in every respect.

10.3.2 Lights, shapes and flags should be provided to indicate that the vessel is engaged in any specific operation for which such signals are used.

10.3.3 In vessels of categories 1 and 2 an efficient daylight signalling lamp should be provided which should not be solely dependent upon the main source of electrical power.

10.3.4 Vessels of category 1 should be equipped with a proper complement of flags and pendants for communication by the International Code of Signals.

10.4 Pilot ladders

Where pilots are embarking or disembarking, a pilot ladder should be provided complying with standards for pilot ladders, reproduced at Annex IX to this Part of the Code.

10.5 Documents

Vessels should be supplied with appropriate logs, certificates and other documents in accordance with the provisions of international and national regulations.

Chapter XI - Crew Accommodation

11.1 General

11.1.1 Location, structure and arrangement of crew accommodation spaces and means of access thereto, should be such as to ensure adequate security, protection against weather and sea and insulation from heat and cold, undue noise, vibration or effluvia from other spaces.

11.1.2 Where in view of operational requirements the competent authority has permitted sleeping rooms to be placed in the fore part of the vessel they should be placed aft of the collision bulkhead.

11.1.3 Bulkheads and decks between accommodation spaces and fish holds; machinery spaces; fuel tanks; galleys, engine, deck and other store rooms; drying rooms, communal wash places or water closets, should be so constructed as to prevent the infiltration of fumes and odours. Direct openings into sleeping rooms from such places should be avoided wherever reasonable or practicable. That part of bulkheads separating such places from sleeping rooms, and also external bulkheads, should be gastight and, where necessary, should prevent the passage of water.

11.1.4 Accommodation spaces should be adequately insulated to prevent loss of heat, condensation or overheating. Care should be taken to provide protection from heat effects of steam and/or hot-water service pipes.

11.1.5 Fuel oil and steam piping, except steam heating systems, should not be led through accommodation spaces unless such arrangement is approved by the competent authority.

11.1.6 In the choice of materials used for construction of accommodation spaces, account should be taken of properties potentially harmful to the health of personnel, or be likely to harbour vermin and mould. Surfaces, including decks, of accommodation and furnishings should be of a kind easily kept clean and hygienic, as well as impervious to damp.

11.1.7 All practical measures should be taken to protect crew accommodation and furnishings against the admission of insects and other pests.

11.2 Lighting, heating and ventilation

11.2.1 All crew accommodation spaces should be adequately lighted, as far as possible by natural lighting. Such spaces should also be equipped with adequate artificial light.

11.2.2 If there are not two independent sources of electricity for lighting, additional lighting should be provided by properly constructed lamps or lighting apparatus for emergency use.

11.2.3 An adequate reading light should be provided for every berth in addition to the normal lighting of the cabin.

11.2.4 Methods of lighting should not endanger the health or safety of the crew or the safety of the vessel.

11.2.5 Adequate heating facilities in accommodation spaces should be provided as required by climatic conditions. Heating facilities should be capable of maintaining a satisfactory air temperature in crew accommodation under normal conditions of service of a fishing vessel and as prescribed by the competent authority.

11.2.6 Facilities for heating should be designed so as not to endanger health or safety of the crew or the safety of the vessel.

11.2.7 Accommodation spaces should be adequately ventilated. Ventilation systems should be capable of control so as to maintain the air in a satisfactory condition and to ensure a sufficiency of air movement in all conditions of weather and climate. The ventilation of galley, sanitary and hospital spaces should be to the open air and, unless fitted with a mechanical ventilation system approved by the competent authority, be independent from that for other crew accommodation.

11.2.8 Accommodation spaces of vessels regularly engaged on voyages in the tropics and other areas with similar climatic conditions, except in deckhouses with satisfactory natural ventilation, should be equipped with mechanical ventilation and, if necessary, with additional electric fans. When necessary to ensure satisfactory ventilation, vessels engaged elsewhere should be equipped either with mechanical means of ventilation or with electric fans.

11.2.9 Drying rooms or lockers for working clothes and oilskin lockers should have adequate ventilation.

11.3 <u>Sleeping rooms</u>

11.3.1 Sleeping rooms should be so planned and equipped as to ensure reasonable comfort for the occupants and to facilitate tidiness.

11.3.2 Wherever reasonable and practicable with respect to the size, type or intended service of a vessel, the number of persons allowed to occupy each sleeping room should not be more than four persons in vessels of 35 m in length and over and six persons in vessels of less than 35 m in length.

11.3.3 Each member of the crew should be provided with an individual berth, the minimum inside dimensions of which should, wherever practicable, be 1.90 m by 680 mm.

11.3.4 Berths should not be placed side by side in such a way that access to one berth can be obtained only over another. Berths should not be arranged in tiers of more than two. The lower berth in a double tier should not be less than 300 mm above the deck; the upper berth should be placed approximately midway between the bottom of the lower berth and the lower side of the deck head beams.

11.3.5 Wherever reasonable and practicable with respect to the size, type or intended service of a vessel, the furnishings of sleeping rooms should include both an adequate clothes locker and a drawer for each occupant. Sleeping rooms should also be fitted with a satisfactory table or desk, adequate and proper seating, curtains for sidelights, a mirror, cabinets for toilet requisites, a book rack and coat hooks.

11.4 Mess rooms

11.4.1 Mess room accommodation separate from sleeping quarters should be provided in all vessels regularly carrying a crew of more than ten persons. Wherever reasonable and practicable it should be provided also in vessels carrying a smaller crew.

11.4.2 Mess rooms should be as close as practicable to the galley.

11.4.3 The dimensions, furnishings and equipment of each mess room should be sufficient for the number of persons likely to use it at any one time.

11.4.4 Wherever practicable, mess rooms should be planned, furnished and equipped to provide facilities for recreation.

11.5 Sanitary facilities

11.5.1 Sufficient sanitary facilities including wash basins and tubs and/or shower baths and water closets should be provided on a scale approved by the competent authority. Wherever practicable, such facilities should be provided as follows:

(i) one tub and/or shower bath for every eight persons or less;

(ii) one water closet for every eight persons or less;

(iii) one wash basin for every six persons or less.

Provided that when the number of persons exceeds an even multiple of the specified number by less than one-half of the specified number, this surplus may be ignored for the purpose of this paragraph.

11.5.2 Cold fresh water and hot fresh water or means of heating water should be available in all wash places.

11.5.3 All sanitary equipment and systems should be of a design, construction and size approved by the competent authority. In particular, showers should have anti-scalding valves of an approved type, sufficient drainage should be provided, and soil and waste discharge pipes should be of adequate dimensions and constructed so as to facilitate cleaning. International standards concerning shipboard sanitary facilities contained in the WHO Guide to Ship Sanitation, 1967, may serve as guidance.

11.5.4 Soil and waste discharge pipes should not pass through fresh water or drinking water tanks or, where practicable, provisions stores. Neither should they, where practicable, pass overhead in mess rooms or sleeping accommodation. Such pipes should be fitted with anti-siphon closures.

11.5.5 Facilities for washing and drying clothes should be provided on a scale appropriate to the number of the crew and the duration of intended voyages. These facilities should include an adequate supply of cold fresh water and hot fresh water or means of heating water. Wherever reasonable and practicable, separate laundry accommodation should be provided.

11.6 Hospital accommodation

A sick bay should be provided in vessels of categories 1 and 2 of 45m in length and over.

11.7 Potable water facilities

Filling, storage and distribution arrangements for potable water should be designed to preclude any possibility of water contamination or overheating. In this connection, the relevant international standards laid down by the WHO in Guide to Ship Sanitation, 1967, should be followed.

11.8 Provision stores

Provision storerooms of adequate capacity should be provided which can be kept cool, dry and well ventilated in order to avoid deterioration of the stores. Where necessary, refrigerators or other low-temperature storage space should be provided.

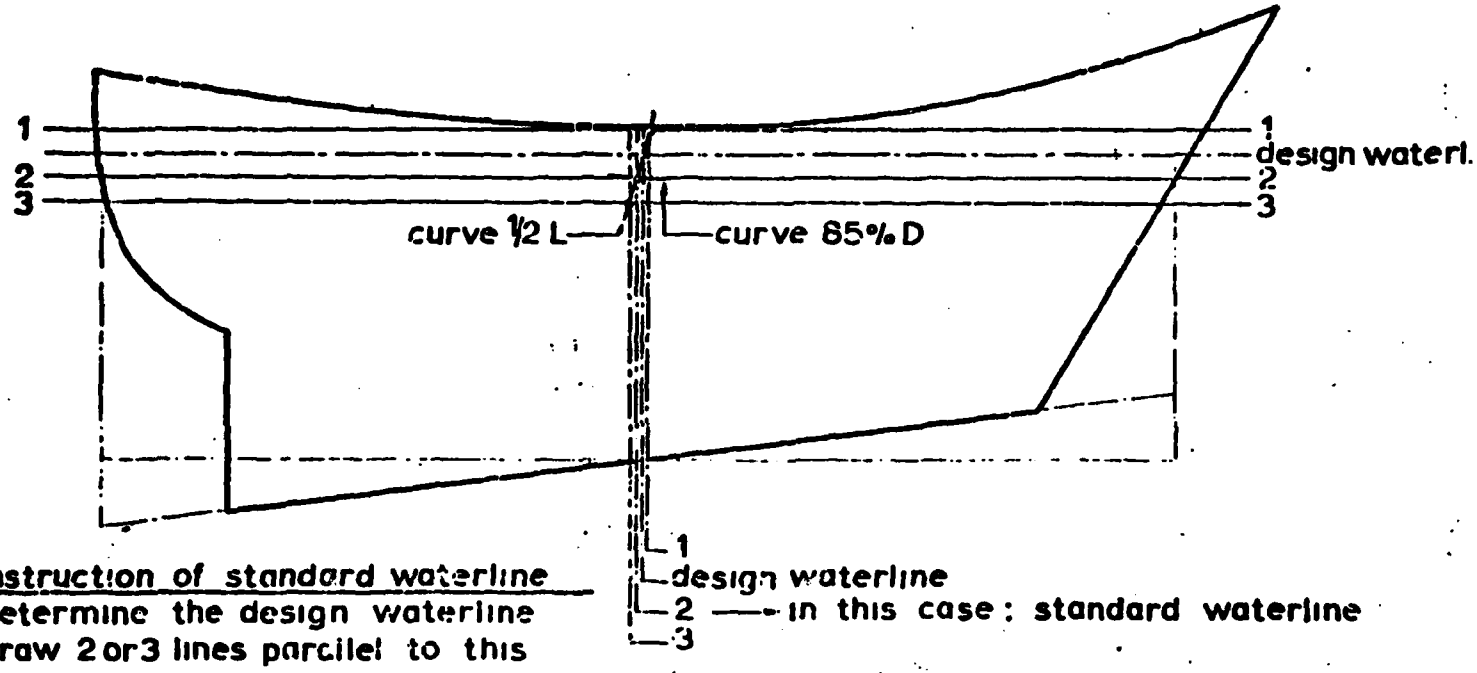
11.9 Cooking facilities

11.9.1 Satisfactory cooking appliances and equipment should provided and should, wherever practicable, be fitted in a separate galley.

11.9.2 Galleys should be of adequate dimensions for the purpose and have sufficient storage space and satisfactory drainage. International standards concerning shipboard food sanitation laid down in the WHO Guide to Ship Sanitation, 1967, may serve as guidance.

ANNEX I

ILLUSTRATION OF TERMS USED IN THE DEFINITIONS(*)

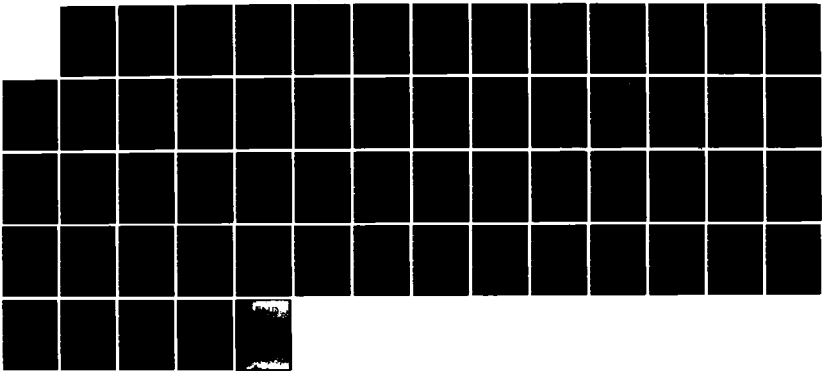


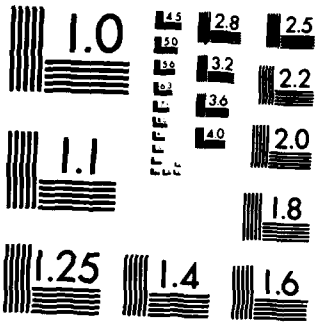
construction of standard waterline

I determine the design waterline
II draw 2 or 3 lines parallel to this waterline
III determine an 85%D- and a ½L curve
IV a line drawn parallel to the design waterline, through the point of intersection of these curves is the standard waterline

(*) Extracted from Unified Definitions of Main Particulars and other Properties of Fishing Vessels approved by the Maritime Safety Committee at its twenty-fourth session and circulated under MSC/Circ.111.

AD-A147 598 CODE OF SAFETY FOR FISHERMEN AND FISHING VESSELS PART B 2/2
SAFETY AND HEALTH..(U) INTER-GOVERNMENTAL MARITIME
CONSULTATIVE ORGANIZATION LONDON (.. 1973
UNCLASSIFIED USCG-CITS-73-1-1 F/G 13/10 NL




1.0
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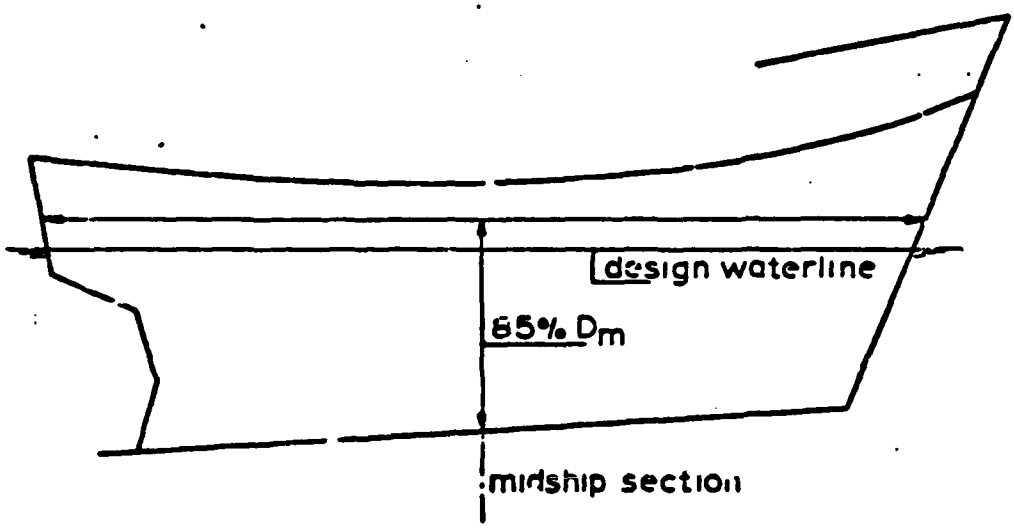
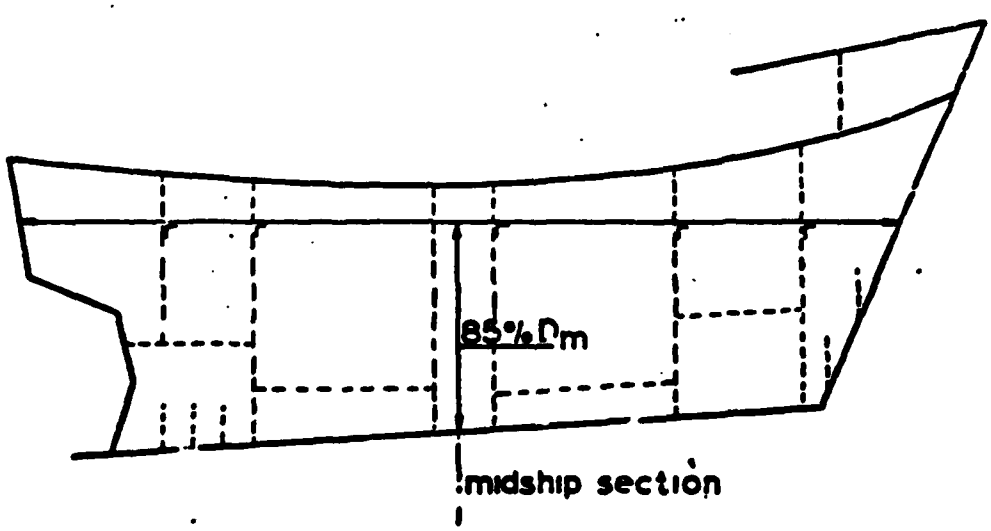
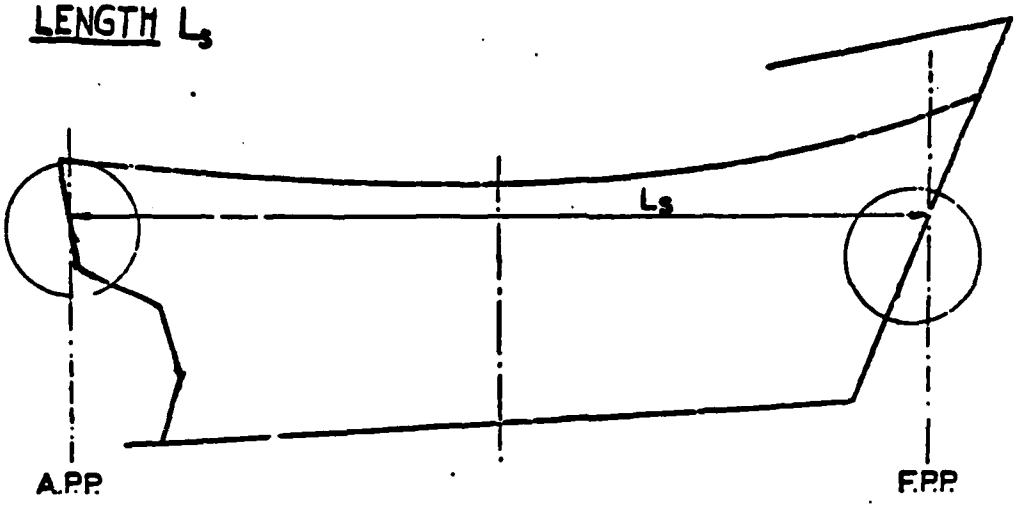
STANDARD WATERLINE



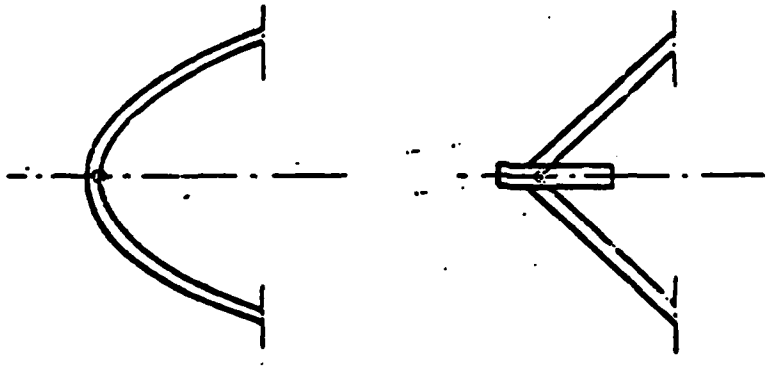
STANDARD WATERLINE



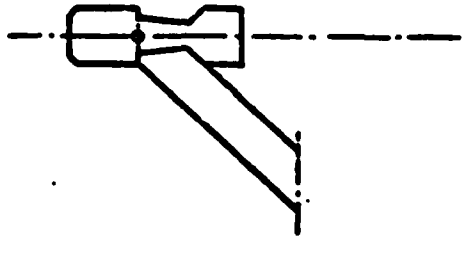
AFT AND FORWARD PERPENDICULARS
and
LENGTH L_s



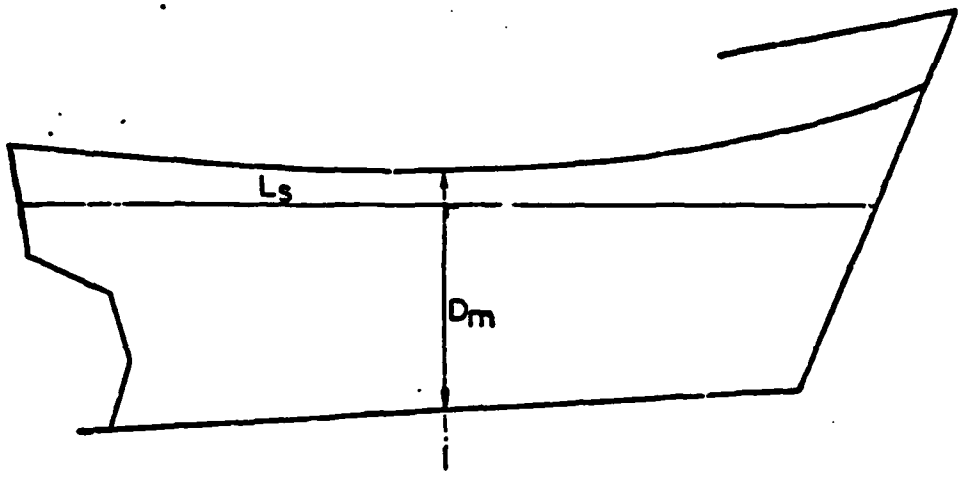
metal shell



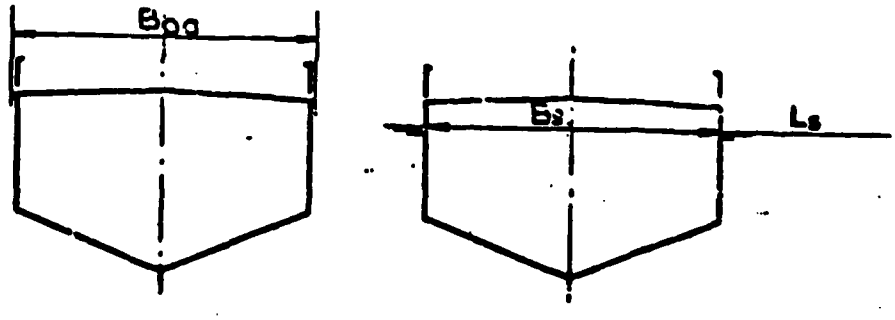
shell of any other material



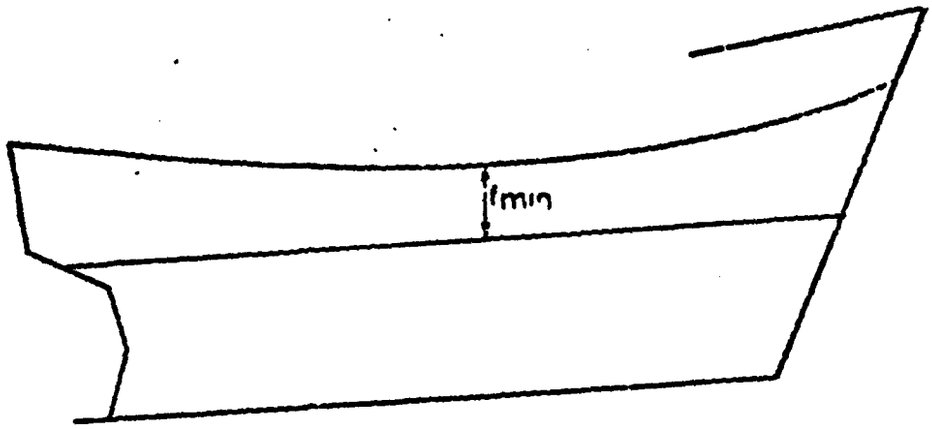
DEPTH (D)



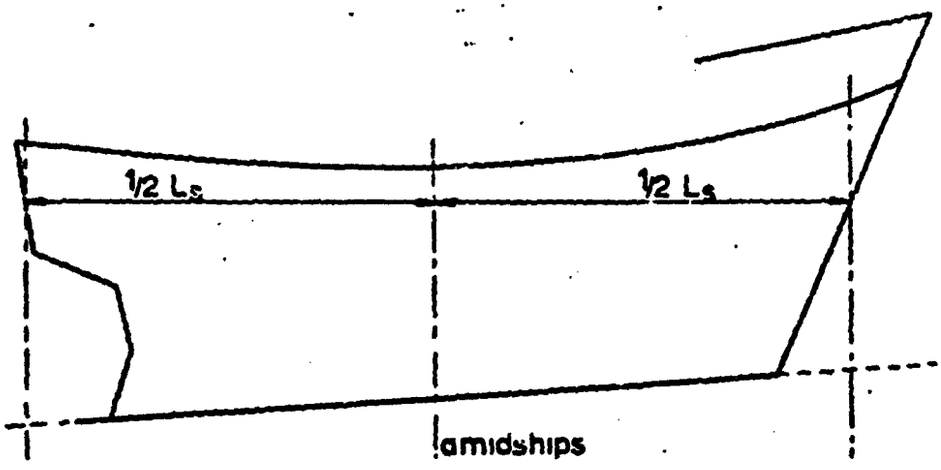
BREADTH (B)



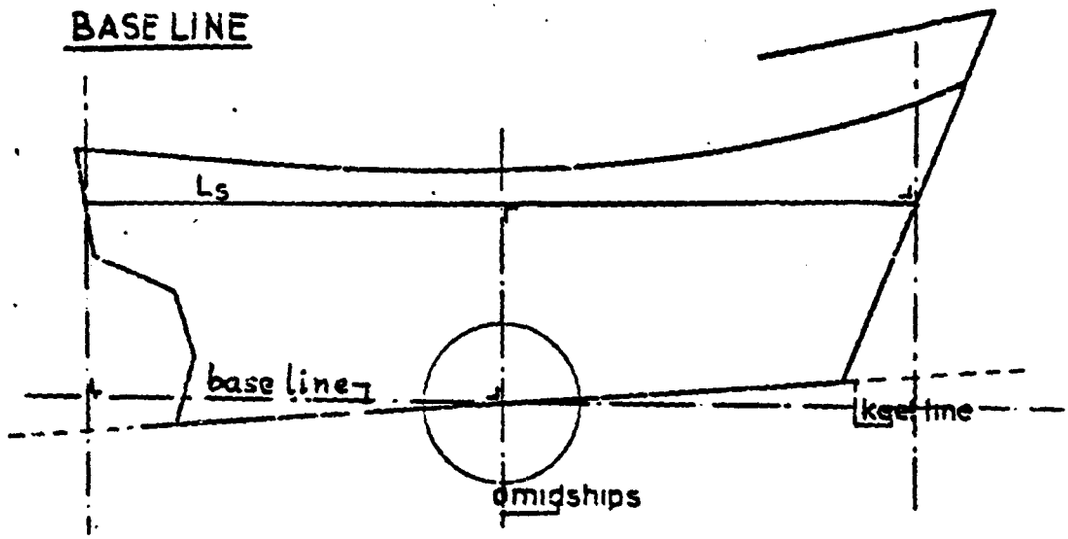
MINIMUM
FREEBOARD (f_{min})



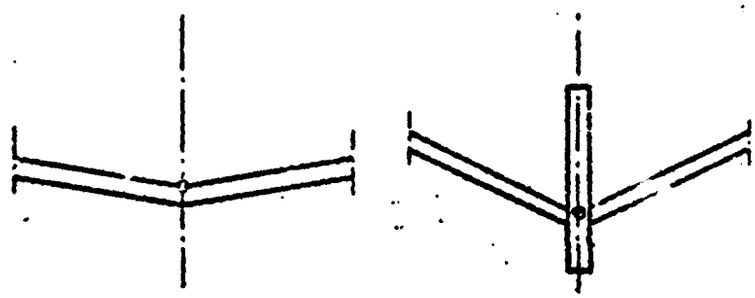
AMIDSHIPS



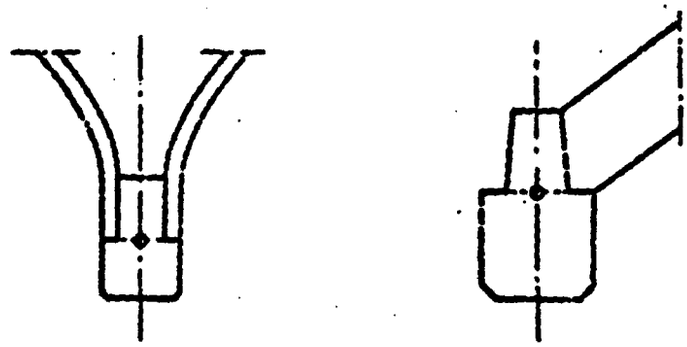
KEEL LINE
and
BASE LINE



metal shell



sheil of any other material



ANNEX II

RECOMMENDED PRACTICE FOR ANCHOR AND MOORING EQUIPMENT

Anchors, chain cables, wires and mooring lines should be determined in accordance with the attached Table, based on an Equipment Number "EN" as follows:

$$EN = \Delta^{\frac{2}{3}} + 2B(a + \Sigma h_i) + 0.1A$$

where Δ - moulded displacement, in tonnes to the maximum design waterline.

B - breadth in m, as defined in 1.2.1.(xii)

a - distance in m from the maximum design waterline to the upper edge of the uppermost complete deck at side amidships.

h_i - height in m on the centreline of each tier of deck houses having a breadth greater than B/4. For the lowest tier h_i is to be measured at centreline from the upper deck or from a notional deck line where there is a local discontinuity in the upper deck.

When calculating h_i sheer and trim are to be ignored.

A - area in m^2 in profile view of the hull, within L_s as defined in 1.2.1(xi) and of superstructures and deck houses above the maximum design waterline having a width greater than B/4.
Screens and bulwarks more than 1.5 m in height are to be regarded as parts of deckhouses when determining h_i and A.

For vessels less than 30 m in length the chain cables may be replaced with wire ropes of equal strength.

For vessels of 30 m in length and over but less than 45 m the chain cable of one anchor may be replaced with wire ropes of equal strength provided a normal chain cable is maintained for the second one.

Trawl warps complying with this requirement may be used as chain cables.

Where wire ropes are substituted for anchor chains their length should be equal to 1.5 times the corresponding tabular length of chain and a chain not less than 12.5 m in length should be provided between anchor and wire rope.

"High Holding Power Anchors" of a design approved by the competent authority may be used as bower anchors, the weight of each such anchor may be 75 per cent of the Table weight for ordinary stockless bower anchors.

The competent authority may require increased anchor equipment for vessels fishing in very rough waters and/or may permit reduction in the equipment for vessels operating in sheltered waters.

Equipment Number		Stockless Bower Anchors		Stud Link Chain Cables for Bower Anchors			Mooring Lines		
					Diameter (mm)				
Exceeding	Not Exceeding	Number	Weight Per Anchor (kg)	Total Length (m)	Mild Steel	Special Quality Steel	Number	Minimum Length of each Line (m)	Minimum Breaking Strength (kg)
1	2	3	4	5	6	7	8	9	10
50	60	2	120	192.5	12.5	-	2	60	3000
60	70	2	140	192.5	12.5	-	2	80	3000
70	80	2	160	250	14	12.5	2	100	3500
80	90	2	180	220	14	12.5	2	100	3750
90	100	2	210	220	16	14	2	110	3750
100	110	2	240	220	16	14	2	110	4000
110	120	2	270	247.5	17.5	16	2	110	4000
120	130	2	300	247.5	17.5	16	2	110	4500
130	140	2	340	275	19	17.5	2	120	4500

1	2	3	4	5	6	7	8	9	10
140	150	2	390	275	19	17.5	2	120	5000
150	175	2	480	275	22	19	2	120	5550
175	205	2	570	302.5	24	20.5	2	120	6000
205	240	2	660	302.5	26	22	2	120	6550
240	280	2	780	330	28	24	3	120	7250
280	320	2	900	357.5	30	26	3	140	8000
320	360	2	1020	357.5	32	28	3	140	8750
360	400	2	1140	385	34	30	3	140	9500
400	450	2	1290	385	36	32	3	140	10250
450	500	2	1440	412.5	38	34	3	140	11000
500	550	2	1590	412.5	40	34	4	160	11500
550	600	2	1740	440	42	36	4	160	12000
600	660	2	1920	440	44	38	4	160	12500
660	720	2	2100	440	46	40	4	160	13000

ANNEX III

MEMORANDUM TO ADMINISTRATIONS ON AN APPROXIMATE DETERMINATION OF SHIP'S STABILITY BY MEANS OF THE ROLLING PERIOD TESTS (for ships up to 70 m in length)*

1. Recognizing the desirability of supplying to Masters of small ships instructions for a simplified determination of initial stability, attention was given to the rolling period test. Studies on this matter have now been completed with the result that the rolling period test may be recommended as a useful means of approximately determining the initial stability of small ships when it is not practicable to give approved loading conditions or other stability information, or as a supplement to such information.

2. Investigations comprising the evaluation of a number of inclining and rolling tests according to various formulae showed that the following formula gave the best results and it has the advantage of being the simplest:

$$GM_o = \left(\frac{fB}{T_r}\right)^2$$

where:

f = factor for the rolling period (different for feet and metric system),

B = breadth of the ship in feet or metric units,

T_r = time for a full rolling period in seconds (i.e. for one oscillation "to and fro" port - starboard - port, or vice versa).

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* Extract from Appendix IV of the Annex to Assembly Resolution A.168(ES.IV).

3. The factor "f" is of the greatest importance and the data from the above tests were used for assessing the influence of the distribution of the various masses in the whole body of the loaded ship.

4. For unloaded fishing boats (but with fuel, stores and equipment), the following average values were observed:

	metric system	feet system
(a) double boom shrimp fishing boats	f ~0.95	f ~0.555
(b) deep sea fishing boats	f ~0.80	f ~0.445
(c) boats with a live fish well	f ~0.60	f ~0.335

The stated values are mean values. Generally, observed f-values were within $\pm$ 0.05 of those given above.

5. These f-values were based upon a series of limited tests and, therefore, Administrations should re-examine these in the light of any different circumstances applying to their own ships.

6. It must be noted that the greater the distance of masses from the rolling axis, the greater the rolling coefficient will be.

Therefore it can be expected that:

- the rolling coefficient for an unloaded ship, i.e. for a hollow body, will be higher than that for a loaded ship;
- the rolling coefficient for a ship carrying a great amount of bunkers and ballast - both groups are usually located in the double bottom, i.e. far away from the rolling axis - will be higher than that of the same ship having an empty double bottom.

7. The above recommended rolling coefficients were determined by tests with vessels in port and with their consumable liquids at normal working levels; thus, the influences exerted by the vicinity of the quay, the limited depth of water and the free surfaces of liquids in service tanks are covered.

8. Experiments have shown that the results of the rolling test method get increasingly less reliable the nearer they approach GM-values of 0.20 m and below.

9. For the following reasons, it is not generally recommended that results be obtained from rolling oscillations taken in a seaway:

(a) Exact coefficients for tests in open waters are not available.

(b) The rolling periods observed may be not free oscillations but forced oscillations due to seaway.

(c) Frequently, oscillations are either irregular or only regular for too short an interval of time to allow accurate measurements to be observed.

(d) Specialized recording equipment is necessary.

10. However, it may be desirable to use the vessel's period of roll as a means of approximately judging the stability at sea. If this is done, care should be taken to discard readings which depart appreciably from the majority of other observations. Forced oscillations corresponding to the sea period and differing from the natural period at which the vessel seems to move should be disregarded. In order to obtain satisfactory results, it may be necessary to select intervals when the sea action is least violent, and it may be necessary to discard a considerable number of observations.

11. In view of the foregoing circumstances, it needs to be recognized that the determination of the stability by means of the rolling test in disturbed waters should only be regarded as a very approximate estimation.

12. The formula given in paragraph 2 can be reduced to

$$GM_o = \frac{F}{T_r^2}$$

and the Administration should determine the F value(s) for each vessel.

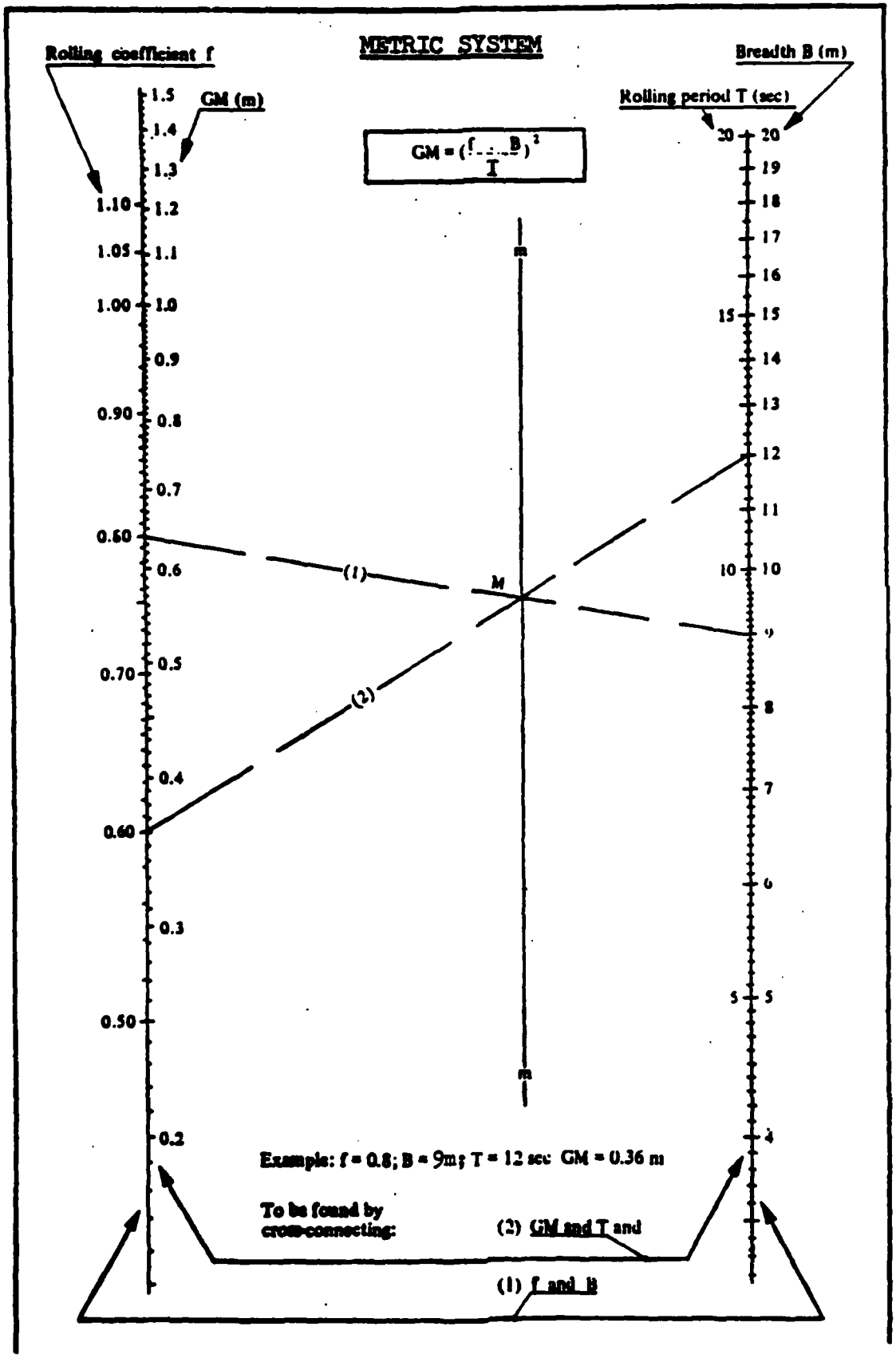
13. The determination of the stability can be simplified by giving the master permissible rolling periods, in relation to the draughts, for the appropriate value(s) of F considered necessary.

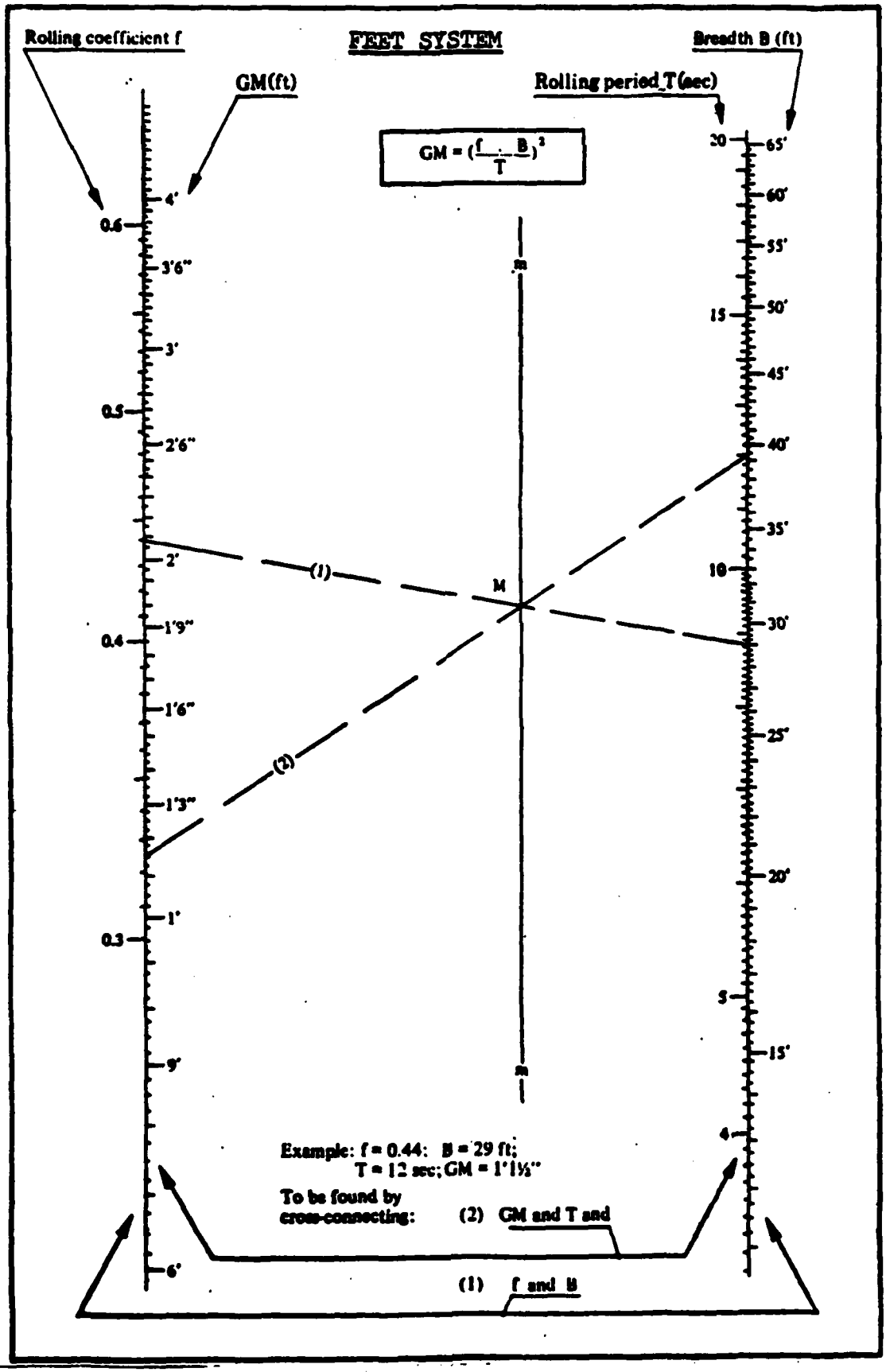
14. The initial stability may also be more easily determined graphically by using one of the attached sample nomograms for feet and/or metric units as described below:

(a) The values for B and f are marked in the relevant scales and connected by a straight line (1). This straight line intersects the vertical line (mm) in the point (M).

(b) A second straight line (2) which connects this point (M) and the point on the T_r scale corresponding with the determined rolling period, intersects the GM scale at the requested value.

15. The Appendix shows an example of a recommended form in which these instructions might be presented by each Administration to the Masters. It is considered that each Administration should recommend the F-value or values to be used.


METRIC SYSTEM
Rolling coefficient f
GM (m)
Breadth B (m)
Rolling period T (sec)
GM = (f · B / T)²
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
1.10
1.05
1.00
0.90
0.60
0.70
0.60
0.50
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
m
M
m
(1)
(2)
Example: f = 0.8; B = 9m; T = 12 sec GM = 0.36 m
To be found by cross-connecting:
(2) GM and T and
(1) f and B


FEET SYSTEM
Rolling coefficient f
GM(ft)
Rolling period T(sec)
Breadth B (ft)
GM = (f · B / T)²
0.6
0.5
0.4
0.3
4'
3'6"
3'
2'6"
2'
1'9"
1'6"
1'3"
1'
9"
6"
m
M
m
(1)
(2)
20
15
10
5
65'
60'
55'
50'
45'
40'
35'
30'
25'
20'
15'
4'
Example: f = 0.44; B = 29 ft;
T = 12 sec; GM = 1'1½"
To be found by cross-connecting:
(2) GM and T and
(1) f and B

APPENDIX

SUGGESTED FORM OF GUIDANCE TO THE MASTER ON AN APPROXIMATE DETERMINATION OF SHIP'S STABILITY BY MEANS OF THE ROLLING PERIOD TEST

Introduction

1. If the following instructions are properly carried out, this method allows a reasonably quick and accurate estimation of the metacentric height, which is a measure of the ship's stability.

2. The method depends upon the relationship between the metacentric height and the rolling period in terms of the extreme breadth of the vessel.

Test Procedure

3. The rolling period required is the time for one complete oscillation of the vessel and to ensure the most accurate results in obtaining this value the following precautions should be observed:

(a) The test should be conducted with the vessel in harbour, in smooth water with the minimum interference from wind and tide.

(b) Starting with the vessel at the extreme end of a roll to one side (say port) and the vessel about to move towards the upright, one complete oscillation will have been made when the vessel has moved right across to the other extreme side (i.e. starboard) and returned to the original starting point and is about to commence the next roll.

(c) By means of a stop-watch, the time should be taken for not less than about 5 of these complete oscillations;

the counting of these oscillations should begin when the vessel is at the extreme end of a roll. After allowing the roll to completely fade away, this operation should be repeated at least twice more. If possible, in every case the same number of complete oscillations should be timed to establish that the readings are consistent, i.e. repeating themselves within reasonable limits. Knowing the total time for the total number of oscillations made, the mean time for one complete oscillation can be calculated.

(d) The vessel can be made to roll by rhythmically lifting up and putting down a weight as far off middle-line as possible; by pulling on the mast with a rope; by people running athwartships in unison; or by any other means. However, and this is most important, as soon as this forced rolling has commenced the means by which it has been induced must be stopped and the vessel allowed to roll freely and naturally. If rolling has been induced by lowering or raising a weight it is preferable that the weight is moved by a dockside crane. If the ship's own derrick is used, the weight should be placed on the deck, at the middle-line, as soon as the rolling is established.

(e) The timing and counting of the oscillations should only begin when it is judged that the vessel is rolling freely and naturally, and only as much as is necessary to accurately count these oscillations.

(f) The moorings should be slack and the vessel "breasted off" to avoid making any contact during its rolling. To check this, and also to get some idea of the number of complete oscillations that can be reasonably counted and timed, a preliminary rolling test should be made before starting to record actual times.

(g) Care should be taken to ensure that there is a reasonable clearance of water under the keel and at the sides of the vessel.

(h) Weights of reasonable size which are liable to swing, (e.g. a lifeboat), or liable to move (e.g. a drum), should be secured against such movement. The free surface effects of slack tanks should be kept as small as is practicable during the test and the voyage.

Determination of the Initial Stability

4. Having calculated the period for one complete oscillation, say T seconds, the metacentric height GM_o can be calculated from the following formula:

$$GM_o = \frac{F}{T^2}$$

where F is ... [to be determined for each particular vessel by the Administration].

5. The calculated value of GM_o should be equal to or greater than the critical value which is ... [to be determined for each particular vessel by the Administration].

Limitations to the Use of this Method

6. A long period of roll corresponding to a GM_o of 0.20 m or below, indicates a condition of low stability. However, under such circumstances, accuracy in determination of the actual value of GM_o is reduced.

7. If, for some reason, these rolling tests are carried out in open, deep but smooth waters, inducing the roll, for example, by putting over the helm, then the GM_o calculated by using the method and coefficient of paragraph 3 above should be reduced by [figure to be estimated by the Administration] to obtain the final answer.

8. The determination of stability by means of the rolling test in disturbed waters should only be regarded as a very approximate estimation. If such test is performed, care should be taken to discard readings which depart appreciably from the majority of other observations. Forced oscillations corresponding to the sea period and differing from the natural period at which the vessel seems to move should be disregarded. In order to obtain satisfactory results, it may be necessary to select intervals when the sea action is least violent, and it may be necessary to discard a considerable number of observations.

ANNEX IV

RECOMMENDED PRACTICE ON PORTABLE FISH-HOLD* DIVISIONS

1. Recognizing the desirability of ensuring the adequate strength of scantlings of portable fish-hold divisions, studies on national practices have been carried out, resulting in the establishment of certain formulae for scantlings, which are recommended to Administrations for their guidance.

2. These formulae represent the average of a wide range of experience covering all types of vessels operating in all sea areas, and in conditions likely to impose the maximum loading on a division. Alternative scantlings might, however, be accepted where experience has shown that these are more appropriate.

3. According to the basic type of construction, the following formulae are recommened for vertical fish-hold divisions:

(a) Vertical steel uprights and horizontal wooden boards

Minimum section modulus of vertical steel uprights

$$Z = 4 \rho s b h^2$$

Minimum thickness of horizontal wooden boards

$$t = \sqrt{8 \rho s b^2}$$

(b) Horizontal steel beams and vertical wooden boards

Minimum section modulus of horizontal steel beams

$$Z = 4 \rho s H S^2$$

Minimum thickness of vertical wooden boards

$$t = \sqrt{3.6 \rho s h^2}$$

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* Appendix V of the Annex of Assembly Resolution A.167(ES.IV) incorporating sub-paragraphs 4(g) and 4(h) to be adopted by the eighth Assembly.

where in the above formulae:

Z = section modulus, - cm^3.

t = thickness of wooden board, - cm.

ρ = density of cargo, - t/m^3.

s = maximum transverse distance between any two adjacent longitudinal divisions or line of supports, - m.

h = maximum vertical span of a column taken to be the hold depth, - m.

b = maximum longitudinal distance between any two adjacent transverse divisions or line of supports, - m.

H = vertical span of a division which is supported by a horizontal beam, - m.

S = horizontal distance between adjacent points of support of a horizontal beam, - m.

4. In applying the above formulae, the following notes should be observed:

(a) The formulae are applicable to longitudinal divisions. Where the divisions are athwartships the formulae should be modified by interchanging s and b.

(b) The formulae were derived on the assumption that the loads were on one side only of the divisions. When it is known that the divisions will always be loaded on both sides, reduced scantlings may be accepted.

(c) If vertical steel uprights are permanent and well connected at both ends with the structure of the ship, reduced scantlings may be accepted depending upon the degree of security provided by the end connections.

(d) In the formula for vertical wooden boards the full depth of the hold is assumed as the unsupported span, where the span is less the thickness may be calculated using the reduced span.

(e) The timber used should be of sound durable quality, of a type and grade which has proved satisfactory for fish-hold divisions and the actual finished thicknesses of boards should be those derived from the formulae. The thickness of boards made from good quality hardwood may be reduced by 12.5 per cent.

(f) Divisions made of other materials should have strength and stiffness equivalent to those associated with the scantlings recommended for wood and steel having regard to the comparative mechanical properties of the materials.

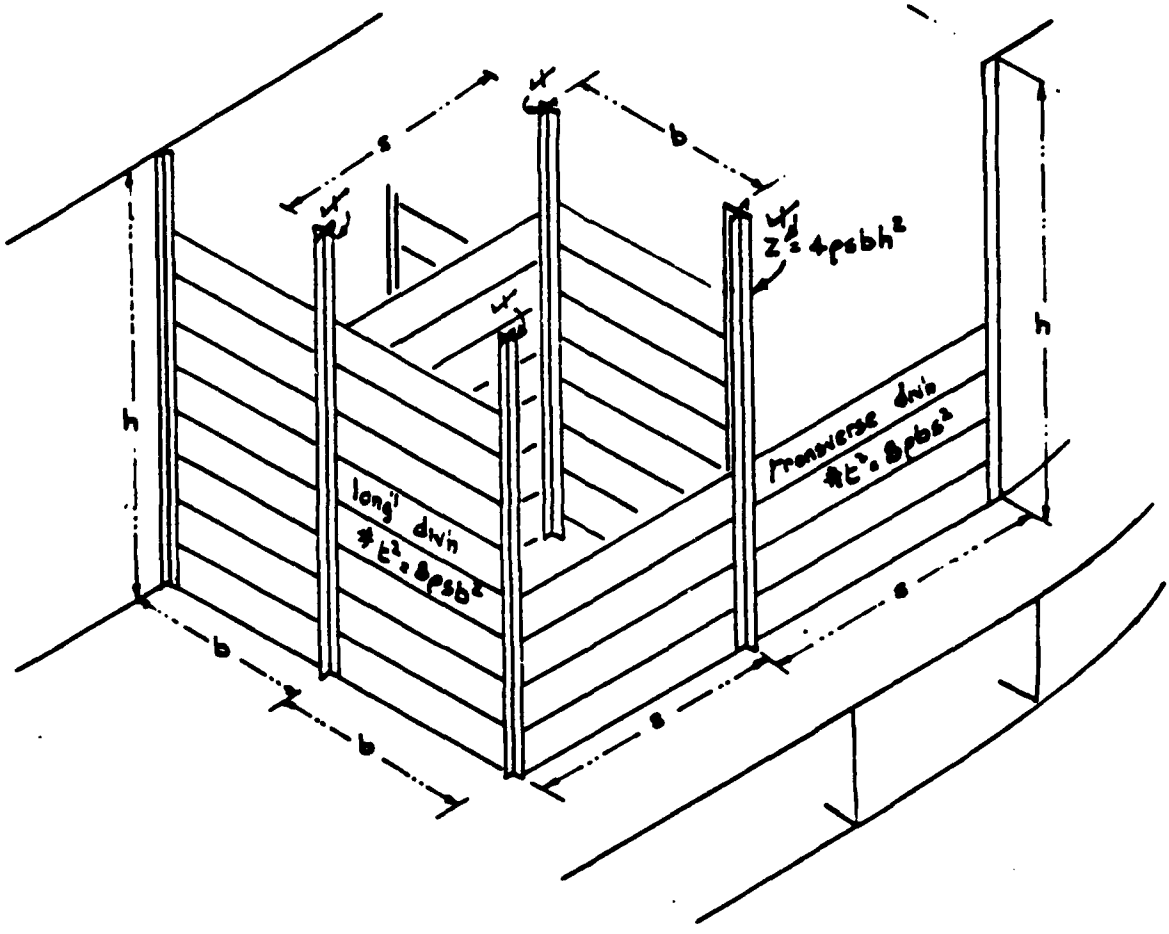
(g) Channelways in stanchions to take poundboards should have a depth of not less than 40mm and the width should be equal to the poundboard thickness plus 5mm;

(h) Each poundboard should have a length not less than the distance between the bottom of the respective channelways into which it will engage minus 10mm.

If poundboards have shaped ends to allow a rotational manoeuvre for easy housing, the extent of end shaping should not be more than allowed by a radius equal to one half the length of the board with its centre at the mid length and depth of the board.

5. Figures 1 and 2 illustrate the application of the formulae.

HORIZONTAL WOOD BOARDS - STEEL UPRIGHTS.



*Note:- When the longitudinal and transverse divisional boards are interchangable b will equal s and the thickness by either formula will be the same. If the boards are required to be of equal thickness but varying span the greater thickness should be used for all the boards when the section modulus is kept constant for all the uprights.

Fig 1.

ANNEX V

RECOMMENDED PRACTICE FOR AMMONIA REFRIGERATION SYSTEMS

1. All electrical equipment on or adjacent to the ammonia machinery flat should be explosion proof and should be protected from the water curtains and sprays as necessary.

2. Flame producing devices and hot surfaces above 427°C in the machinery space should be located as remotely as practicable from the ammonia machinery flat.

3. Ammonia equipment should be surrounded by an efficient water curtain and, in addition, water sprays should be directed at all potential leak sources, e.g. pipe connections and flanges, compressors, etc. The water curtain and sprays should be provided with an adequate supply of water which should be maintained under constant pressure.

4. A large capacity ventilation system including mechanical exhaust should be provided for the ammonia machinery flat. The mechanical exhaust ventilation fan motor is to be of the explosion proof type or fitted externally to the trunking.

5. Emergency drain pipelines should be provided for quick draining of refrigerants from refrigeration systems. Stop valves in drain pipes should be located in a closed, sealed and glazed box fitted outside of the compartment containing the refrigeration machinery and as near as possible to its entrance.

6. An ammonia leak detection system should be provided for the ammonia machinery flat with an indicator in the wheelhouse.

7. Coamings should be provided around the ammonia machinery flat.

8. Suitable gas masks should be provided inside and outside the machinery space.

9. Remote controls located in the wheelhouse or another suitable place should be provided for the following services:

   (i) the water curtain and spray systems;

   (ii) the ammonia machinery flat ventilation system;

   (iii) the main engine.

10. Means are to be provided for stopping the ammonia compressor prime movers from the wheelhouse or another suitable place.

11. Means of escape direct to deck from the ammonia machinery flat should be provided in addition to any other escape which may be required by the competent authority.

ANNEX VI

RECOMMENDED CONTENTS OF FISHING VESSELS' MEDICINE CHEST*

INSTRUCTIONS

Table I presents a minimal scale for fishing vessels for unlimited service (Category 1) and not carrying a doctor. The table is based on a six-month voyage. Double the quantity of medicines and dressings should be carried for voyages extending up to 12 months except where indicated by an X, when the amount should be a fixed quantity regardless of the length of the voyage. For instruments, appliances, and general medical equipment the amounts carried should be a fixed quantity regardless of the length of the voyage, unless otherwise indicated.

Table II presents a minimal scale for fishing vessels proceeding to sea up to 200 miles from a place of shelter (Category 2), and for fishing vessels proceeding to sea up to 50 miles from a place of shelter (Category 3) and not carrying a doctor. Items marked (*) need not be carried in Category 3 vessels. For instruments, appliances and general medical equipment the amounts carried should be a fixed quantity regardless of the length of the voyage, unless otherwise indicated.

Formulae for certain medicines are given in the right-hand columns for the information of chemists. Where provided for in the tables the chemist may supply an equivalent drug, but the container must carry a special label stating that the item is the equivalent of the standard item in the table, so that the captain is left in no doubt about its purpose.

The adult dose of all medicines must be clearly shown on labels, which must be rendered durable by varnishing.

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* Based on recommended contents of ships' medicine chest given in the International Medical Guide for Ships, WHO, Geneva, 1967

All containers labelled "POISON" must be supplied in distinctive bottles and these, together with other containers labelled "For external use only", must be stored in a special locker. The keys for this locker are retained by the captain, who may issue one key to the officer or other person to whom he delegates responsibility for the sick on board.

THE SHIP'S MEDICINE CHEST

	Item		Table I Category 1	Table II Categories 2 and 3	Additional information for use of chemist and for labelling.
	MEDICINES				
..	...ethylinae glyceris (Glycerine ear drops) EAR DROPS		30 ml	30 ml	Supply in bottle of distinctive design with dropper.
..	Capsulae amyli nitris (Amyl nitrite capsules)	X	6	6	Each capsule 0.3 ml amyl nitrite, covered with absorbent fabric. To be renewed after 12 months.
3.	Capsulae tetracyclini hydrochloridi (Tetracycline hydrochloride capsules) TETRACYCLINE CAPSULES		80	80(*)	Each capsule 250 mg tetracycline hydrochloride, or an equivalent broad-spectrum antibiotic with similar therapeutic effects (to be so labelled).
4.	Compressi acidi acetylsalicylici (Acetylsalicylic acid tablets) ASPIRIN TABLETS		250	200	Each tablet 300 mg acetylsalicylic acid.
..	Compressi aminophyllini (Aminophylline tablets) AMINOPHYLLINE TABLETS	X	20	20(*)	Each tablet 300 mg aminophylline. Label "POISON - to be used only on medical advice by radio".
6.	Compressi butobartitali (Butobarbitone tablets) SEDATIVE TABLETS		40	20(*)	Each tablet 100 mg butobarbitone. Supply in bottle of distinctive design. Label "POISON".
7.	Compressi chloroquini sulfatis (Chloroquine sulfate tablets) MALARIA TABLETS	X	300	100(*) (Only for ships operating in malarious areas)	Each tablet 150 mg chloroquine base: chloroquine sulfate 200 mg. Chloroquin. phosphate 250 mg may be supplied as an alternative.
8.	Compressi chlorothiazidi (Chlorothiazide tablets)	X	20	20(*)	Each tablet 500 mg chlorothiazide. Supply in bottle of distinctive design. Label "POISON - to be used only on medical advice transmitted in plain language and not by code."
9.	Compressi chlorpromazini hydrochloridi (Chlorpromazine hydrochloride tablets) TRANQUILLIZER TABLETS	X	20	20(*)	Each tablet 50 mg chlorpromazine hydrochloride. Supply in bottle of distinctive design. Label "POISON - to be used only on medical advice by radio".
10.	Compressi codeini phosphatis (Codeine phosphate tablets) CODEINE TABLETS		200	100	Each tablet 15 mg codeine phosphate, or an equivalent drug with similar therapeutic effects (to be so labelled).
11.	Compressi colocynthidis et jalapae co. (Compound colocynth and jalap tablets) VEGETABLE LAXATIVE TABLETS		100	40	Each tablet 60 mg compound colocynth extract/15 mg hyoscyamus dry extract/ 15 mg jalap resin/15 mg podophyllum resin/0.006 ml peppermint oil. Or an equivalent laxative with similar therapeutic effects (to be so labelled).
12.	Compressi digoxini (Digoxin tablets)	X	20	20	Each tablet 0.25 mg digoxin. Supply in bottle of distinctive design. Label "POISON - to be used only on medical advice transmitted in plain language and not by code."
13.	Compressi ephedrini hydrochloridi (Ephedrine hydrochloride tablets) EPHEDRINE TABLETS		60	40	Each tablet 30 mg ephedrine hydrochloride.
14.	Compressi glycerylis trinitratis (Glyceryl trinitrate tablets) HEART TABLETS	X	20	20	Each tablet 0.5 mg glyceryl trinitrate. Supply in bottle of distinctive design. Label "POISON".

THE SHIP'S MEDICINE CHEST (continued)

Item	Table I Category 1	Table II Categories 2 and 3	Additional information for use of chemist and for labelling.
[illegible] (continued)			
[illegible] Hyoscini Hydro- bromidi (Hyoscine hydrobromide tablets) [illegible] TABLETS	100	50	Each tablet 0.3 mg hyoscine hydro-bromide, or an equivalent drug with similar therapeutic effects (to be so labelled). Supply in bottle of distinctive design. Label "POISON".
[illegible] kalii permanganatis (Potassium permanganate tablets)	50	20	Each tablet 60 mg potassium permanganate. Label "One tablet dissolved in 600 ml of water may be used as an antiseptic lotion or stomach wash".
[illegible] magnesii trisilicatis (Magnesium trisilicate tablets) [illegible] TABLETS	250	100	Each tablet 250 mg magnesium trisilicate/120 mg dried aluminium hydroxide gel/0.02 ml peppermint oil.
[illegible] natrii chloridi solv. [illegible] tablets) [illegible] TABLETS X	1000	500	Each tablet 500 mg sodium chloride, 200 mg dextrose. Double this quantity to be carried in vessels spending long periods in [illegible] areas.
[illegible] barbitali (Barbitone tablets) [illegible] TABLETS	50	40	Each tablet 30 mg barbitone. Supply in bottle of distinctive design. Label "POISON".
[illegible] phenoxymethyl- [illegible] illini (Phenoxymethylpenicillin tablets) [illegible] TABLETS	300	120	Each tablet 120 mg phenoxymethyl-penicillin. Store in a cool dry place in a container which will prevent access of moisture.
[illegible] proguanili hydrochloridi (Proguanil hydrochloride tablets)	100	100 (Only for ships operating in malarious areas)	Each tablet 100 mg proguanil hydrochloride. For ships proceeding on voyages to malarious areas the quantity is to be increased to 50 tablets per crew member.
Compressi promethazini hydrochloridi (Promethazine hydrochloride tablets) [illegible] TABLETS	40	40	Each tablet 25 mg promethazine hydrochloride or an equivalent antihistamine with similar therapeutic effects (to be so labelled).
Compressi sulfadimidini (Sulfadimidine tablets) [illegible] TABLETS	200	100	Each tablet 500 mg sulfadimidine or an equivalent sulfonamide with similar therapeutic effects (to be so labelled). Supply in bottle of distinctive design. Label "POISON".
Compressi sulfamethoxypyridazini (Sulfamethoxypyridazine tablets) [illegible] TABLETS X	300	100	Each tablet 500 mg sulfamethoxypyridazine. Supply in bottle of distinctive design. Label "POISON".
25. Conspersus dicophani (DDT dusting powder) INSECTICIDE POWDER	500 g	250 g(*)	A white powder for application to persons and their clothing; harmless to skin and clothing and designed to destroy human infestation by insects and mites. Instructions for use on the label and insufflator included.
26. Conspersus zinci, amyli, et talci (Dusting powder of zinc, starch, and talc) ZINC DUSTING POWDER	150 g	150 g	A white powder consisting of 25% zinc oxide, 25% starch, and 50% talc (q weight). Label "External use".
27. Conspersus zinci undecenoatis (Dusting powder of zinc undecenoate) RINGWORM POWDER	120 g	120 g(*)	A powder consisting of 500 g starch, 100 g zinc undecenoate, 20.8 g undecenoic acid, 4.7 ml pumilio pine oil, and 1000 g light kaolin.
28. Dimethylis phthalas (Dimethyl phthalate) INSECT REPELLENT	One bottle per crew member		To be carried on all vessels proceeding to malarious ports. The supply per individual should be considered adequate for seven days. To be increased if the vessel remains longer in a malarious area. 50-ml bottle. Label "External use".
29. Guttae sulfacetamidi (Sulfacetamide eye drops) ANTISEPTIC EYE DROPS	30 ml	30 ml(*)	A solution of sulfacetamide sodium 10%, for eye drops. Supply in bottle of distinctive design with dropper.

	Item	Table I Category 1	Table II Categories 2 and 3	Additional information for use of chemist and for labelling
	MEDICINES (continued)			
31.	Guttae tetracainaer (Tetracaine eye drops) ANAESTHETIC EYE DROPS X	30 ml	30 ml	A solution of tetracaine hydrochloride 1% for eye drops. Supply in bottle of distinctive design with dropper. Label "External use - POISON".
32.	Injectio adrenalini (Adrenaline injection) ADRENALINE INJECTION	5	5(*)	Each ampoule 1 mg adrenaline. Supply in "Ampins". Label "To be used only on medical advice, except in case of anaphylactic shock due to penicillin injection".
33.	Injectio benzylpenicillini (Procaine penicillin G injection) PENICILLIN INJECTION	50	25(*)	Each ampoule 600,000 international units of procaine penicillin in a sterile suspension in water or an equivalent antibiotic with similar therapeutic effects (to be so labelled). Store in a cool, dry place and renew when necessary.
34.	Injectio morphini sulfatis (Morphine sulfate injection) MORPHINE INJECTION X	10	5	Each ampoule 15 mg morphine sulfate. Supply in "Ampins". Label "POISON".
35.	Injectio natrii chloridi (Sodium chloride injection) NORMAL SALINE INJECTION	4	4(*)	Each bottle 1000 ml water with 9 g sodium chloride, sterile. Supply administration set and instructions.
36.	Injectio streptomycini sulfatis (Streptomycin sulfate injection) STREPTOMYCIN INJECTION X	6	6(*)	Each ampoule 1000 mg streptomycin base, as a sterile solution in water. Store in a cool, dry place and renew when necessary.
37.	Injectio tetracyclini hydrochloridi (Tetracycline hydrochloride injection) TETRACYCLINE INJECTION	6	3	Each ampoule 100 mg tetracycline, or an equivalent broad-spectrum antibiotic with similar therapeutic effects (to be so labelled).
38.	Linctus scillae opiatus (Linctus of squill, opiate) COUGH LINCTUS	500 ml	250 ml	A mixture in equal volumes of camphorated opium tincture, oxymel of squill, tolu syrup, or an equivalent mixture with similar therapeutic effects (to be so labelled).
39.	Linimentum methylis salicylatis (Methyl salicylate liniment) SALICYLATE LINIMENT	250 ml	250 ml(*)	Supply in bottle of distinctive design. Label "External use", "Not for burns".
40.	Lotio calaminae (Calamine lotion) CALAMINE LOTION	500 ml	250 ml	Supply in bottle of distinctive design. Label "External use".
41.	Lotio cetrimidi (Cetrimide lotion) ANTISEPTIC SOLUTION	500 ml	250 ml	A solution of cetrimide 1% in water or equivalent. Supply in bottle of distinctive design. Label "External use."
42.	Magnesii hydroxidum (Magnesium hydroxide mixture) LIQUID LAXATIVE	500 ml	250 ml	A mixture containing 7.9% by weight of magnesium hydroxide with peppermint oil flavouring.
43.	Mistura kaolini et morphinae (Kaolin and morphine mixture) DIARRHOEA MIXTURE	250 ml	250 ml(*)	A mixture containing 2000 mg light kaolin, 650 mg sodium bicarbonate, 0.75 ml chloroform and morphine tincture, water to 15 ml (in each dose).
44.	Naristillae ephedrinae (Ephedrine nose drops) NOSE DROPS X	30 ml	30 ml	A solution of norephedrine hydrochloride 1% for nasal drops. Supply in bottle of distinctive design with dropper. Label "External use".
45.	Natrii bicarbonatas (Sodium bicarbonate)	125 g	125 g	
46.	Oleum arachis (Arachis oil)	250 ml	250 ml	Oleum olivae (olive oil) may be supplied as alternative.

THE SHIP'S MEDICINE CHEST (continued)

	Item	Table I Category 1	Table II Categories 2 and 3	Additional information for use of chemist and for labelling.
MEDICINES (continued)				
48.	Oleum caryophylli (Oil of cloves) MOUTH ANAESTHETIC X	30 ml	30 ml	Supply in wide-mouthed bottle of distinctive design. Label "External use".
49.	Paraffinum molle flavum (Yellow soft paraffin) SOFT PARAFFIN	125 g	125 g	
50.	Tinctura benzoini composita (Tincture of benzoin compound) INHALATION MIXTURE	100 ml	100 ml(*)	A mixture containing 10 g crushed benzoin, 7.5 g prepared storax, 2.5 g tolu balsam, 2 g aloes, alcohol (90%) to 100 ml. Label "External use". "Add 5 ml to 500 ml hot water and inhale vapours".
51.	Unguentum acidi benzoici Compositum (Compound benzoic acid ointment) WHITFIELD'S OINTMENT	100 g	100 g(*)	An ointment containing 6% benzoic acid, 3% salicylic acid, 90% emulsifying ointment.
52.	Unguentum bacitracini (Bacitracin ointment) ANTIBIOTIC OINTMENT	120 g	60 g	An ointment containing bacitracin in a soft paraffin base. Supply in 15 g tube.
53.	Unguentum benzocaini Compositum (Compound benzocaine ointment) MIST-CAINE OINTMENT	120 g	120 g	An ointment containing 10% benzocaine, 45% zinc ointment, 45% hamamelis ointment. Supply in 15 g tubes.
54.	Unguentum gammabenzeni hexachloridi (Gamma benzene hexachloride ointment) ANTI-SCABIES OINTMENT X	150 g	150 g	An ointment containing gamma benzene hexachloride 1%. Supply in 50 g tube.
55.	Unguentum xylocaini hydrochloridi (Xylocaine ointment) LOCAL ANAESTHETIC OINTMENT X	60 g	30 g(*)	An ointment containing 5% xylocaine hydrochloride. Supply in 15 g tube.
56.	Unguentum zinci oxidi (Zinc oxide ointment) ZINC OINTMENT	200 g	100 g	An ointment containing 15% zinc oxide.
INSTRUMENTS				
1.	Eye spud with covered point	1	1	To be made of stainless steel.
2.	Forceps: dental packing	1	1	To be made of stainless steel.
3.	Forceps: dissecting	1	1	To be made of stainless steel.
4.	Forceps: haemostatic	2	1	To be made of stainless steel, length 15 cm.
5.	Forceps: sinus	1	1	To be made of stainless steel, length 15 cm.
6.	Forceps: splinter	1	1	To be made of stainless steel, with wide oblique ends.
7.	Scalpel: handle	1	1	No. 3 handle. Suitable for standard scalpel blades.
8.	Scalpel: blades	6	6	No. 10 or No. 11 blades.
9.	Scissors	1	1	To be made of stainless steel, one blade sharp-pointed, the other blunt-pointed. Length 15 cm.
10.	Thermometer	3	2	Lens-fronted, stubby-end, half-minute thermometer, with metal or plastic case.
11.	Canvas roll for above instruments	1	1	
12.	Applicators	50	25	To be made of wood.
13.	Artificial airway	1	1	For mouth-to-mouth breathing.

THE SHIP'S MEDICINE CHEST (continued)

	Item	Table I Category 1	Table II Categories 2 and 3	Additional information for use of chemist and for labelling.
	INSTRUMENTS (continued)			
14.	Injection syringe: 2 ml	2	-	Both syringes: glass body with metal plunger and nozzle for standard needles.
15.	Injection syringe: 5 ml	2	1	Supplied in metal case.
16.	Injection needles: hypodermic- diameter 6, length 25 mm	10	6	Alternatively, complete disposable syringes, in which case the quantities indicated here for the needles will apply to each size of syringe.
17.	Injection needles: intramuscular - diameter 8, length 40 mm	10	6	
18.	Luer adaptors for syringe	1	-	For use with hypodermic syringes to enable any type of needle to be used.
19.	Tongue depressors	30	20	To be made of wood.
20.	Catheter sets: olivary ends	1	1	Set: size 6, 10, 14 F or 3, 5, 7 UK.
21.	Catheter sets: soft rubber	1	1	One of each together with stilettes in a closed glass or plastic cylinder with a sprinkling of powdered talc: or a suitable number of disposable plastic catheters in the same sizes.
22.	Enema kit	1	1	To consist of graduated funnel, rubber tubing 1 metre long with control clamp attached, connexion and rubber catheter. Supply in a box plainly labelled "FOR ENEMA USE ONLY".
23.	Stomach tube	1	1	Standard rubber or plastic 1 m long and fitted with plastic funnel. Tube to bear a mark indicating when its tip has reached the stomach.
	APPLIANCES			
24.	Splints: common set	1	1	Wooden splints. Suitable for fractures of limbs and hands.
25.	Splints: serrated, of Gooch type	1	1	A sheet of split 1 m x 1 m.
26.	Splints: thigh, wooden	1	1	Largest size.
27.	Splints: metal set	1	1	Metal with padded ring. One set of three.
28.	Splint: Thomas			
29.	Tourniquet	1	1	Esmarch or Samways type.
30.	Truss: single right pad	1	1	Elastic band types with adjustable buckles. The bands to be not less than 1 m in length.
31.	Truss: single left pad	1	1	
32.	Truss: double pads	1	1	
33.	Ligatures, catgut	3	2	In sealed glass tubes sterilized with a fracture scratch and directions for breaking the tube.
34.	Sutures with needles	4	2	Sutures of nylon or silk fitted to eyeless needles with a cutting edge, in sterile sealed glass tubes with fracture scratch and directions for breaking tube. Half to be straight needles, half to be curved.
35.	Suture strips, non-stitch	24	12	Size 2.5 x 50 cm. Butterfly or dumb-bell shape for drawing superficial wounds together in sterile sealed packet.

THE SHIP'S MEDICINE CHEST (continued)

	Item	Table I Category 1	Table II Categories 2 and 3	Additional information for use of chemist and for labelling
	APPLIANCES (continued)			
36.	Compressory bandages with safetypins	2	2	Half to be of medium size and half to be of large size.
	DRESSING			
37.	Adhesive elastic bandage, box	2	2(*)	5 cm x 1 m. Supply in a metal container.
38.	Adhesive plaster: small	1	1	Zinc oxide plaster. Supply on a spool. 2.5 cm x 1 m.
39.	Adhesive plaster: large	1	1	7.5 cm x 1.5 m. Zinc oxide plaster. Supply on a spool.
40.	Bandage crepe	4	2	7.5 cm x 1.5 m. Each separately wrapped with size on label.
41.	Bandage roll, gauze, open weave: small	10	10	2.5 cm x 3 m } Each separately wrapped, with size on label.
42.	Bandage roll, gauze, open weave: medium	10	10	5.0 cm x 4 m }
43.	Bandage roll, gauze, open weave: large	10	10	7.5 cm x 4 m }
44.	Bandage triangle	4	2	1 x 1 x 1.3 m. Each separately wrapped with size on label.
45.	Burn and wound dressing, box	5	3	10 x 10 cm. Sterile bleached cotton or rayon cloth evenly impregnated with yellow soft paraffin, in a polythene envelope hermetically sealed and free from moisture. Ten envelopes per box.
46.	Dressing, adhesive strip	1	1	6 cm x 1 m. in a sterile packet.
47.	First aid/emergency dressing: small	3	3	7.5 x 10 cm pad. 5 cm x 3 m bandage.
48.	First aid/emergency dressings: medium	3	3	10 x 15 cm pad. 5 cm x 3 m bandage.
49.	First aid/emergency dressings: large	3	3	15 x 20 cm pad. 7.5 cm x 4 m bandage.

Additional information for 47, 48 and 49 above:

Pad: cottonwool enclosed in absorbent gauze.
Bandage: open-weave gauze with pad stitched to it 30 cm from one end. Pad to be folded lengthwise with the surface of the dressing on the inside and the rolled end of the bandage on the outside. Free end of bandage to be wound round the rolled end and the pad. Sterilized in separate sealed wrappers. Label with size of pad and following instruction: "Unwind short length of bandage, straighten pad by pulling on ends of bandage. Apply pad to wound without touching it. Bandage firmly."

50.	Gauze, plain sterile: small	5	5	30 cm x 1 m	Supply in separate packet and label with size and name of item.
51.	Gauze, plain sterile: large	10	3	1 x 1 m	
52.	Gauze absorbent ribbon	1	1	2.5 cm x 3 m	
53.	Jaconet or equivalent	1	1	Bleached cotton cloth waterproofed on one side.	
4.	Lint, absorbent cotton: small	5	3	15 x 30 cm	Supply in separate packet and label with size and name of item.
5.	Lint, absorbent cotton: large	10	3	30 x 30 cm	
6.	Rolls of cottonwool: small	10	10	20 cm wide, 50 g	
7.	Rolls of cottonwool: large	1	1	30 cm wide, 200 g	

THE SHIP'S MEDICINE CHEST (continued)

Item	Table I Category 1	Table II Categories 2 and 3	Additional information for use of chemist and for labelling
DRESSINGS (continued)			
58. First aid satchel	1	1	A canvas bag with a strap containing: 2 bandages, crepe; 6 bandages, triangle. 4 small, 2 medium, 1 large } first aid/emergency dressings. 1 roll of cottonwool, large 6 safety-pins, medium. 1 artificial airway.
GENERAL MEDICAL EQUIPMENT			
59. Basins: round	1	1	White enamelled iron, aluminium or plastic, not less than 20 cm diameter and 10 cm depth. Inscribed: "MEDICAL".
60. Basins: kidney	1	1	White enamelled iron, aluminium or plastic, length 25 cm.
61. Bed-pan	1	1	White enamelled iron, large size.
62. Eye bath	1	1	Made of glass or plastic that is not affected by boiling.
63. Eye droppers	3	3	Made of glass or plastic that is not affected by boiling.
64. Eye shades	3	3	
65. Feeding cup	1	1	Made of porcelain or plastic that is not affected by boiling.
66. Finger stalls	3	6	Assorted sizes, leather, or larger quantities if disposable type.
67. Hot water bottles	2	1	Rubber, with covers.
68. Ice bags	1	1	For lowering temperature.
69. Measuring glass; small	2	1	Graduated in ml or in minims and drachms.
70. Measuring glass: large	2	1	Graduated in ml and spoonful doses, or in drachms/ounces and spoonful doses.
71. Microscope slides	3	3(*)	
72. Rubber sheeting	1	1(*)	Size 1 x 2 m, rolled on a wooden core.
73. Safety pins	15	15	Size 5 cm, mounted on a card or cards.
74. Sputum pot: disposable, or	20	10	Waxed cardboard with a twist-on lid, wide base, and height not less than 5 cm.
75. Sputum pot: non disposable	1	1	Enamelled iron with close-fitting hinged lid.
76. Steriliser	1	1	Size not less than 17.5 x 5 x 7.5 cm. Electric with automatic cut-out, or steamheated, or with spirit lamp.
77. Stretcher	1	1	Neil Robertson type or equivalent.
78. Surgical gloves, pairs	2	2	Large size, roughened rubber.
79. Temperature charts	5	5	Four-hourly chart combining temperature, pulse, and respiration.
80. Urine bottle	1	1	Enamelled iron or plastic, with handle
81. Urine test papers: combined strips albumin/sugar	2	1(*)	Container with close-fitting screw cap of metal, strips together with suitable desiccant (silica gel). Renew after 12 months or earlier if colour changes are noticed. Label "Combined testing strip for albumin and sugar".

THE SHIP'S MEDICINE CHEST (continued)

Item	Table I Category 1	Table II Categories 2 and 3	Additional information for use of chemist and for labelling
GENERAL MEDICAL EQUIPMENT (continued)			
89. Salt test paper	2	1(*)	Booklets of 20 test papers impregnated with silver salt, protected from light. Label "Salt in urine test papers. Keep away from light".
90. Bottles: dispensing, small	6	5(*)	60-ml bottles with screw caps. Marked at 4 ml (1 teaspoonful).
91. Bottles: dispensing, large	6	5(*)	180-ml bottles with screw caps. Marked at 15 ml (1 tablespoonful).
92. Bottles: poison	3	3(*)	60-ml bottles of distinctive design.
93. Dispensing envelopes	100	50	Small size.
94. [illegible] knife	1	1	For dispensing ointments.
95. Ointment boxes	15	6	For dispensing ointments. Either chipwood boxes stacked in sets of three, or tins of 15 g.
96. Labels: plain	100	100	
97. Labels: poison	50	50	
98. Concentrated antiseptic	500 ml	500 ml	A solution of cetrimide 20% in water or equivalent. Label "Concentrated antiseptic lotion" together with full instructions for use. The recommended dilutions to be suitable for the purpose specified.
99. Chloride of lime			Supply in sealed and dated tins with instructions. The minimum amount to be carried is to be calculated on the amount of stabilized chloride of lime or its equivalent necessary to chlorinate the ship's largest freshwater tank so as to produce a concentration of one part of free chlorine in one million parts of water.
93. Dilute alcohol	250 ml	200 ml(*)	70%. Supply in bottle of distinctive design and label "External use". Alternatively, surgical spirit may be supplied.
94. Disinfectant	2 litres	1 litre	Supply in bottle of distinctive design and label "Disinfectant" together with full instructions for use. The recommended dilutions to be suitable for the purpose specified. To consist of a white fluid in a finely dispersed, stabilized emulsion containing coal tar acids or other phenolic bodies with or without hydrocarbons.
95. Methyl alcohol	500 ml	500 ml	Only if sterilizer is heated by a spirit lamp.
96. International Medical Guide for Ships	1	1	
97. World Directory of Venereal Diseases: Treatment Centres at Ports, published by the World Health Organization.			

ANNEX VII

RECOMMENDATION FOR TESTING LIFE-JACKETS (*)

Reliability of the finished life-jacket and the component materials is essential. Items to consider include effects of stowage in a compressed condition for extended periods of disuse, weathering, ageing, exposure to petroleum or other products and exposure to heat or cold.

A prototype life-jacket should undergo donning and water performance tests.

1. Donning Test

As life-jackets will be used by uninitiated persons, often in adverse conditions, it is essential that risk of incorrect donning be minimized. Ties and fastenings necessary for proper performance should be few and simple. Life-jackets should readily fit all sizes of adults, both lightly and heavily clad.

(a) Test Subjects

Persons unfamiliar with the use of life-jackets should be selected to perform donning tests. The individuals chosen should include large and small persons, both male and female.

(b) Clothing

Each subject should be tested wearing normal street clothing. The test should be repeated with the subject wearing heavy-weather clothing.

(c) Test

Subjects should don the life-jacket unassisted using only the instructions provided by the manufacturer.

* Annex of Assembly Resolution A.169(ES.IV)

(d) Assessment

The observer should note:

(i) ease and speed of donning;
(ii) the simplicity and number of fastenings;
(iii) proper fit and adjustment;
(iv) ease of movement.

2. Water Performance Tests

This portion of the test is intended to determine the ability of the life-jacket to assist a helpless person or one in an exhausted or unconscious state. All tests should be carried out in fresh water under still conditions.

(a) Test Subjects

For these tests a variety of subjects, both male and female of high, medium and low weight and height ranges should be selected. Only well-qualified swimmers should be used, since the ability to relax in the water is rarely otherwise obtained.

(b) Clothing

Subjects should wear only swimming costumes.

(c) Instructions to Subjects

The subjects should be made familiar with each of the tests set out below, particularly the requirement regarding relaxing and exhaling in the face-down position.

(d) Tests

The subject should don the life-jacket, unassisted, using only the instructions provided by the manufacturer. The observer should note the same points as in (i) to (iv) of 1(d) above. The observer should then ensure that the life-jacket has been properly adjusted before continuing with the tests.

(i) Righting Tests

The subject should swim at least three gentle strokes (breast stroke) and then with minimum headway relax, with the head down and the lungs partially filled, simulating a state of utter exhaustion. The period of time should be recorded starting from the completion of the last stroke until the mouth of the subject comes clear of the water. The above test should be repeated after the subject has exhaled. The time should again be ascertained as above. The freeboard should be recorded from the water surface to the mouth with the subject at rest.

(ii) Drop Test

Without readjusting the life-jacket, the subject should drop vertically into the water, feet-first, from a height of at least 3 metres. The freeboard to the mouth should be recorded after the subject comes to rest.

(e) Assessment

After each of the water tests described above, the subject should come to rest with the trunk floating inclined backwards at an angle of not less than 20° and preferably not more than 50° from the vertical with the mouth clear of the water by approximately 12 cms. In the righting tests, the mouth should be clear of the water in approximately five seconds. Any tendency of the life-jacket to become dislodged during testing should be noted, as should physical harm done to the subject.

As far as possible, similar criteria should be applied in the approval of life-jackets for children.

Each life-jacket should be suitably marked showing that it has been approved by the Administration.

ANNEX VIII

RECOMMENDATION ON PERFORMANCE STANDARDS FOR CERTAIN SHIPBORNE ELECTRONIC AIDS TO NAVIGATION INCLUDING RADAR, RADIO DIRECTION-FINDERS (RDF), ECHO-SOUNDERS, GYRO-COMPASSES

RECOMMENDATION ON NAVIGATIONAL (*) RADAR EQUIPMENT

1. The radar equipment required by Regulation 12 of Chapter V of the International Convention for the Safety of Life at Sea, 1960, should provide an indication in relation to the ship of the position of other surface craft and obstructions and of buoys, shorelines and navigational marks in a manner which will assist in avoiding collision and in navigation.

2. It should comply with the following minimum requirements:

(a) Range performance

The operational requirement under normal propagation conditions, when the radar aerial is mounted at a height of 15 metres above sea level is that the equipment should give a clear indication of:

(i) Coastlines

At 20 nautical miles when the ground rises to 60 metres.

At 7 nautical miles when the ground rises to 6 metres.

(ii) Surface Objects

At 7 nautical miles a ship of 5,000 tons gross tonnage, whatever her aspect.

At 3 nautical miles a small vessel of length 10 metres.

At 2 nautical miles an object such as a navigational buoy having an effective echoing area of approximately 10 square metres.

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* Annex of Assembly Resolution A.222(VII)

(b) Minimum range

The surface objects specified in paragraph (a)(ii) of this Recommendation should be clearly displayed from a minimum range of 50 metres up to a range of one nautical mile, without adjustment of controls other than the range selector.

(c) Display

(i) The equipment should provide a relative plan display of not less than 180 mm effective diameter.

(ii) The equipment should be provided with at least five ranges, the smallest of which is not more than one nautical mile and the greatest of which is not less than 24 nautical miles. The scales should be preferably of 1:2 ratio. Additional ranges may be provided.

(iii) Positive indication should be given of the range of view displayed and the interval between range rings.

(d) Range measurement

(i) The primary means provided for range measurement should be fixed electronic range rings. There should be at least four range rings displayed on each of the ranges mentioned in paragraph 2(c)(ii), except that on ranges below one nautical mile range rings should be displayed at intervals of $\frac{1}{4}$ nautical mile.

(ii) Fixed range rings should enable the range of an object, whose echo lies on a range ring, to be measured with an error not exceeding 1.5 per cent of the maximum range of the scale in use, or 70 metres, whichever is the greater.

(iii) Any additional means of measuring range should have an error not exceeding 2.5 per cent of the maximum range of the displayed scale in use, or 120 metres, whichever is the greater.

(e) Heading indicator

(i) The heading of the ship should be indicated by a line on the display with a maximum error not greater than $\pm 1^{\circ}$.
The thickness of the displayed heading line should not be greater than $\frac{1}{2}^{\circ}$.

(ii) Provision should be made to switch off the heading indicator by a device which cannot be left in the "heading marker off" position.

(f) Bearing measurement

(i) Provision should be made to obtain quickly the bearing of any object whose echo appears on the display.

(ii) The means provided for obtaining bearings should enable the bearing of a target whose echo appears at the edge of the display to be measured with an accuracy of $\pm 1^{\circ}$ or better.

(g) Discrimination

(i) The equipment should display as separate indications, on the shortest range scale provided, two objects on the same azimuth separated by not more than 50 metres in range.

(ii) The equipment should display as separate indications two objects at the same range separated by not more than 2.5° in azimuth.

(iii) The equipment should be designed to avoid, as far as is practicable, the display of spurious echoes.

(h) Roll

The performance of the equipment should be such that when the ship is rolling $\pm$ 10° the echoes of targets remain visible on the display.

(i) Scan

The scan should be continuous and automatic through 360 degrees of azimuth.
The target data rate should be at least 12 per minute.
The equipment should operate satisfactorily in relative wind speeds of up to 100 knots.

(j) Azimuth Stabilization

(i) Means should be provided to enable the display to be stabilized in azimuth by a transmitting compass.
The accuracy of alignment with the compass transmission should be within $\frac{1}{2}$° with a compass rotation rate of 2 r.p.m.

(ii) The equipment should operate satisfactorily for relative bearings when the compass control is inoperative or not fitted.

(k) Performance Check

Means should be available, while the equipment is used operationally, to determine readily a significant drop in performance relative to a calibration standard established at the time of installation.

Anti-clutter devices

Means should be provided to minimize the display of unwanted responses from precipitation and the sea.

(l) Operation

(i) The equipment should be capable of being switched on and operated from the main display position.

(ii) Operational controls should be accessible and easy to identify and use.

(iii) After switching on from cold, the equipment should become fully operational within 4 minutes.

(iv) A standby condition should be provided from which the equipment can be brought to a fully operational condition within one minute.

(v) The equipment should continue to operate in accordance with the requirements of this recommendation in the presence of variations of the power supply normally to be expected in a vessel.

(m) Interference

(i) All steps should be taken to eliminate as far as practicable the causes of, and to suppress, radio interference between the radar equipment and other equipment on board.

(ii) Mechanical noise from all units should be so limited as not to prejudice the hearing of sounds on which the safety of the ship might depend.

(iii) Each unit of the equipment normally installed in the vicinity of a standard or a steering magnetic compass should be clearly marked with the minimum distances at which it may be mounted.

(iv) After installation and adjustment on board, the bearing accuracy as prescribed in this recommendation should be maintained without further adjustment irrespective of the variation of external magnetic fields.

(o) Sea or ground stabilization

Sea or ground stabilization, if provided, should not degrade the accuracy of the display below the requirements of this recommendation, and the view ahead on the display should not be unduly restricted by the use of this facility.

(p) Durability and resistance to effects of climate

The radar equipment should be capable of continued operation under the conditions of vibration, humidity and change of temperature likely to be experienced in the vessel in which it is installed.

3. The aerial system should be installed in such a manner that the efficiency of the display is not impaired by the close proximity of the aerial to other objects. In particular, blind sectors in the forward direction should be avoided.

RECOMMENDATION ON PERFORMANCE STANDARDS FOR RADIO DIRECTION-FINDING SYSTEMS(*)

1. Introduction

1.1 The direction-finding equipment required by Regulation 12 of Chapter V of the International Convention for the Safety of Life at Sea, 1960 is to indicate both bearing and sense of radio transmissions in the frequency bands specified in paragraph 2 of this Recommendation.

1.2 In addition to the provisions of Regulation 11 of Chapter IV, of the aforesaid Convention, as amended, the equipment should comply with the following minimum performance requirements.

2. Frequency ranges and classes of emission

The equipment should be capable of receiving signals of classes of emission A1, A2 and A2H in the frequency range 255 to 525 kHz and A1, A2, A2H, A3 and A3H in the frequency range 2167 to 2197 kHz.

3. Selectivity

The selectivity should be such as to allow a bearing to be taken readily without interference from other radio transmissions on frequencies more than 2 kHz from the desired signal.

4. Signal identification

4.1 Means of audio-monitoring should be provided regardless of the method used for direction-finding.

4.2 The equipment should be suitable for use with headphones. A loudspeaker, if provided, should be capable of being rendered inoperative by simple means.

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* Annex of Assembly Resolution A.223(VII)

5. Bearing indication

Means should be provided to indicate the bearing of the desired transmission. Such indication should be capable of being easily, rapidly and precisely resolved within 0.25 degrees.

6. Bearing accuracy

6.1 The instrumental accuracy in taking relative bearings should be within $\pm 1^{\circ}$. This requirement should be met at all frequencies in the frequency bands specified in paragraph 2 of this Recommendation and throughout the whole 360 degrees of azimuth at field strength values between 50 μV/m and 50 mV/m.

Note

The instrumental accuracy referred to above does not include the operational accuracy attainable in service, which should be determined for each installation taking into account paragraphs (a)(iv), (a)(v) and (a)(vii) of Regulation 11 of Chapter IV, as amended. In particular the operational accuracies in the 2 MHz band should be sufficient for homing purposes.

6.2 Pre-set facilities to correct the quadrantal error should normally be provided for the frequency band 255-525 kHz.

7. Manual controls and their operation

7.1 A tuning scale or indicator should be provided, calibrated to indicate directly the carrier frequency of the signal to which the equipment is intended to be tuned.

7.2 (a) If a tuning scale is provided, at all points in in its range, 1 mm should correspond to not more than 2.5 kHz in the frequency range 255-525 kHz.

(b) The maritime distress frequencies should be prominently marked.

(c) Where other means of frequency indication are provided, the resolution should be at least 1 kHz.

7.3 All controls should be of such size and location as to permit normal adjustments to be easily performed, and should be easy to identify and use.

7.4 The sense switch, if fitted, should be of a non-locking type.

8. Operational availability

The equipment should be ready for operation within 60 seconds of switching on.

9. Power supply

9.1 If provision is made for operating the equipment from more than one source of electrical energy arrangements for rapid change-over should be provided.

9.2 Means should be incorporated for the protection of the equipment from excessive voltages, transients and accidental reversal of power supply polarity.

9.3 The equipment should be capable of operating in accordance with the requirements of this Recommendation in the presence of such variations of the power supply as are normally expected in a vessel.

10. Durability and resistance to effects of climate

The equipment should be capable of continuous operation under the conditions of vibration, humidity and change of temperature likely to be experienced in the vessel in which it is installed.

11. Special requirements for different methods of direction-finding

11.1 Aural minimum method

(a) With a field strength sufficient to ensure a signal/noise ratio of at least 50 dB, a change in the setting of the bearing indicator of 5° in either direction from the position of minimum output should cause the audio-frequency output to increase by not less than 18 dB. Similarly, a change of 90° in either direction should cause an increase of not less than 35 dB.

(b) The equipment should be provided with a minimum-clearing control giving a noticeable minimum of the output at all settings.

(c) The sense should be determined with reference to the lower output.

(d) The sense ratio in the frequency ranges 255-525 kHz and 2167-2197 kHz should be 15 dB and 10 dB, respectively.

(e) The automatic gain control, if provided, should be rendered inoperative automatically when the equipment is used for bearing determination.

11.2 Other methods

(a) There should be means of indicating that the receiver gain and signal strength are sufficient to enable a correct bearing to be taken.

(b) With a field strength of 1 mV/m the indicated bearing should not change by more than 1° when the receiver is detuned to a point where the indication referred to in sub-paragraph (a) above shows that the signal strength is just sufficient to take a bearing.

(c) For any signal of strength sufficient to give a bearing indication, there should be no observable change of indicated bearing when the beat frequency oscillator is switched on.

(d) Fluctuations of the indicated bearing caused by any servo mechanism should not exceed ± 0.5° from the mean value.

(e) If, after identifying station the bearing of which is required, it is necessary to check or alter the adjustment of any control as part of the process of direction-finding, this check and adjustment should be capable of being made within 10 seconds.

12. Miscellaneous

12.1 The equipment should be protected from excessive voltages induced in the aerials.

12.2 The equipment should be clearly marked with the minimum safe distance at which it may be installed from a standard or a steering magnetic compass.

12.3 The equipment should be provided with an indication of manufacturer, type and/or number.

12.4 (a) The equipment should be so constructed that it is readily accessible for maintenance purposes.

(b) Information should be provided to enable competent members of a ship's staff to operate and maintain the equipment efficiently.

RECOMMENDATION ON PERFORMANCE STANDARDS FOR ECHO-SOUNDING EQUIPMENT(*)

Introduction

1.1 The echo-sounding equipment required by Regulation 12 of Chapter V, of the International Convention for the Safety of Life at Sea, 1960, as amended, should provide reliable information on the depth of water under a ship to aid navigation.

1.2 The equipment should comply with the following minimum performance requirements.

2. Range of depths

Under normal propagation conditions the equipment should be capable of measuring any clearance under the transducer between 2 metres and 400 metres.

3. Range scales

3.1 The equipment should provide a minimum of two range scales one of which, the deep range, should cover the whole range of depth, and the other, the shallow range, one tenth thereof.

3.2 The scale of display should not be smaller than 2.5 mm per metre depth on the shallow range scale and 0.25 mm per metre depth on the deep range scale.

4. Method of presentation

4.1 The primary presentation should be a graphical display which provides the immediate depth and a visible record of soundings. Other forms of display may be added but these should not affect the normal operation of the main display.

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* Annex of Assembly Resolution A.224(VII)

4.2 The record should, on the deep range scale, show at least 15 minutes of soundings.

4.3 Either by marks on the recording paper, or by other means, there should be a clear indication when the paper remaining is approximately 10 per cent of the length of the roll.

5. Illumination

Fully adequate illumination should be provided to enable identification of controls and facilitate reading of record and scales at all times. Facilities for dimming should be provided.

6. Pulse repetition rate

The pulse repetition rate should be not slower than 12 pulses per minute.

7. Accuracy of measurement

Based on a sound speed in water of 1500 metres per second, the allowable tolerance on the indicated depth should be:

either

± 1 metre on the shallow range scale
± 5 metres on the deep range scale

or

± 5 per cent of the indicated depth, whichever is the greater.

8. Roll and pitch

The performance of the equipment should be such that it will meet the requirements of this Recommendation when the ship is rolling ± 10° and/or pitching ± 5°.

Power supply

9.1 The equipment should be capable of operating in accordance with the requirements of this Recommendation in the presence of such variations of the power supply as are normally expected in a vessel.

9.2 Means should be incorporated for the protection of the equipment from excessive currents and voltages, transients and accidental reversal of power supply polarity.

9.3 If provision is made for operating the equipment from more than one source of electrical energy, arrangements for rapidly changing from one source of supply to the other should be incorporated.

10. Interference

10.1 All reasonable and practicable steps should be taken to eliminate the causes of, and to suppress, radio interference to other equipment on board.

10.2 Mechanical noise from all units should be so limited as not to prejudice the hearing of sounds on which the safety of the ship might depend.

10.3 Each unit of the equipment should be marked with the minimum safe distances at which it may be mounted from a standard or a steering magnetic compass.

11. Durability and resistance to effects of climate

The equipment should be capable of continuous operation under the conditions of sea states, vibration, humidity and change of temperature likely to be experienced in the vessel in which it is installed.

12. Miscellaneous

12.1 The equipment should be provided with an indication of manufacturer, type and/or number.

12.2 (a) The equipment should be so constructed that it is readily accessible for maintenance purposes.

(b) Information should be provided to enable competent members of a ship's staff to operate and maintain the equipment efficiently.

PROPOSED RECOMMENDATION ON PERFORMANCE STANDARDS FOR GYRO-COMPASSES

1. INTRODUCTION

1.1 The gyro-compass required by Regulation 12 of Chapter V, of the International Convention for the Safety of Life at Sea, 1960, as amended, should determine the direction of the ship's head in relation to geographic (true) north.

1.2 The equipment should comply with the following minimum performance requirements.

2. DEFINITIONS

For the purpose of this Recommendation, the following definitions apply:

(a) The term "gyro-compass" comprises the complete equipment and includes all essential elements of the complete design.

(b) The "true heading" is the horizontal angle between the vertical plane passing through the true meridian and the vertical plane passing through the ship's fore and aft datum line. It is measured from True North (000°) clockwise through 360°.

(c) The compass is said to be "settled" if any three readings taken at intervals of 30 minutes (when the compass is on a stationary base) are within a band of 0.7 degrees.

(d) The "settle point heading" is the average value of three readings taken at 30 minute intervals after the compass has settled.

(e) The "settle point error" is the difference between settle point heading and true heading.

(f) The errors to which the gyro-compass is subject are considered to have a probability of 68.3 per cent, where the errors are taken as differences between the observed values and their mean value.

The "maximum error" is understood as triple the above error and has a probability of 99.7 per cent.

3. METHOD OF PRESENTATION

The compass card should be graduated in equal intervals of one degree or a fraction thereof. A numerical indication should be provided at least at every ten degrees, starting from 000° clockwise through 360°.

4. ILLUMINATION

Fully adequate illumination should be provided to enable reading of scales at all times. Facilities for dimming should be provided.

5. ACCURACY

5.1 Settling time of equipment

The compass should settle within six hours of switching on in latitudes of up to 70°.

5.2 Performance under operational conditions

(a) The maximum value of the settle point error of the master compass should not exceed ± 2° in the general conditions mentioned in paragraphs 6.1 and 8 and including variations in magnetic field likely to be experienced in the vessel in which it is installed.

(b) The maximum error of the master compass in latitudes up to 70° should not exceed:

(i) ± 1° when the ship is travelling on a straight course at a constant speed in conditions of calm sea;

(ii) ± 2.5° due to a rapid alteration of course of 180° at speeds up to 20 knots;

(iii) $\pm 2^{\circ}$ due to a fast alteration of speed of 20 knots;

(iv) $\pm 3^{\circ}$ when rolling and pitching with any period between 3 and 15 seconds, a maximum angle of 22.5° and a maximum horizontal acceleration of 3 m/s^2.

(c) The maximum divergence in reading between the master compass and repeaters should not exceed $\pm 0.3^{\circ}$ under the conditions mentioned in paragraph 5.2(a).

Note: When the compass is used for purposes other than steering and bearing, a higher accuracy might be necessary.

To ensure that the maximum error referred to in sub-paragraph (b)(iv) is not exceeded in practice, it will be necessary to pay particular attention to the siting of the master compass.

6. POWER SUPPLY

6.1 The equipment should be capable of operating continuously in accordance with the requirements of this Recommendation in the presence of such variations of the power supply as are normally expected in a vessel.

6.2 Means should be incorporated for the protection of the equipment from excessive currents and voltages, transients and accidental reversal of power supply polarity.

6.3 If provision is made for operating the equipment from more than one source of electrical energy, arrangements for rapidly changing from one source of supply to the other should be incorporated.

7. INTERFERENCE

7.1 All steps should be taken to eliminate as far as practicable the causes of, and to suppress, electromagnetic interference between the gyro-compass and other equipment on board.

7.2 Mechanical noise from all units should be so limited as not to prejudice the hearing of sounds on which the safety of the ship might depend.

7.3 Each unit of the equipment should be marked with the minimum safe distances at which it may be mounted from a standard or a steering magnetic compass.

8. DURABILITY AND RESISTANCE TO EFFECTS OF CLIMATE

The equipment should be capable of continuous operation under the conditions of vibration, humidity and change of temperature likely to be experienced in the vessel in which it is installed.

9. CONSTRUCTION AND INSTALLATION

9.1 The master compass and any repeaters used for taking visual bearings should be installed in a ship with their fore and aft datum lines parallel to the ship's fore and aft datum lines to within $\pm$ 0.5°. The lubber line should be in the same vertical plane as the centre of the card of the compass and should be aligned accurately in the fore and aft direction.

9.2 Means should be provided for correcting the errors induced by speed and latitude.

9.3 An automatic alarm should be provided to indicate a major fault in the compass system.

9.4 The system should be designed to enable heading information to be provided to other navigational aids such as radar, radio direction-finder and automatic pilot.

9.5 Information should be provided to enable competent members of a ship's staff to operate and maintain the equipment efficiently.

9.6 The equipment should be provided with an indication of manufacture, type and/or number.

9.7 The equipment should be so constructed and installed that it is readily accessible for maintenance purposes.

ANNEX IX

RECOMMENDED STANDARDS FOR PILOT LADDERS*

Whenever the distance from sea level to the point of access to the vessel is more than 9 m, access from the pilot ladder to the vessel should be by means of an accommodation ladder or other equally safe and convenient means.

Treads of pilot ladders should be not less than 40 cm long, 11.5 cm wide and 2.5 cm in depth. Steps should be joined in such a manner as will provide a ladder of adequate strength whose treads are maintained in a horizontal position and not less than 30.5 cm or more than 38 cm apart.

A man-rope and a safety line should be provided for ready use if required.

Handholds should be provided to assist pilots to pass safely and conveniently from the head of the ladder into the vessel or on to the vessel's deck.

If necessary spreaders should be provided at such intervals as will prevent the ladder from twisting.

A vessel with rubbing bands or whose construction makes it impossible to comply fully with the provision that the ladder should be secured at a place where each step will rest firmly against the vessel's side should comply with this provision as closely as possible.

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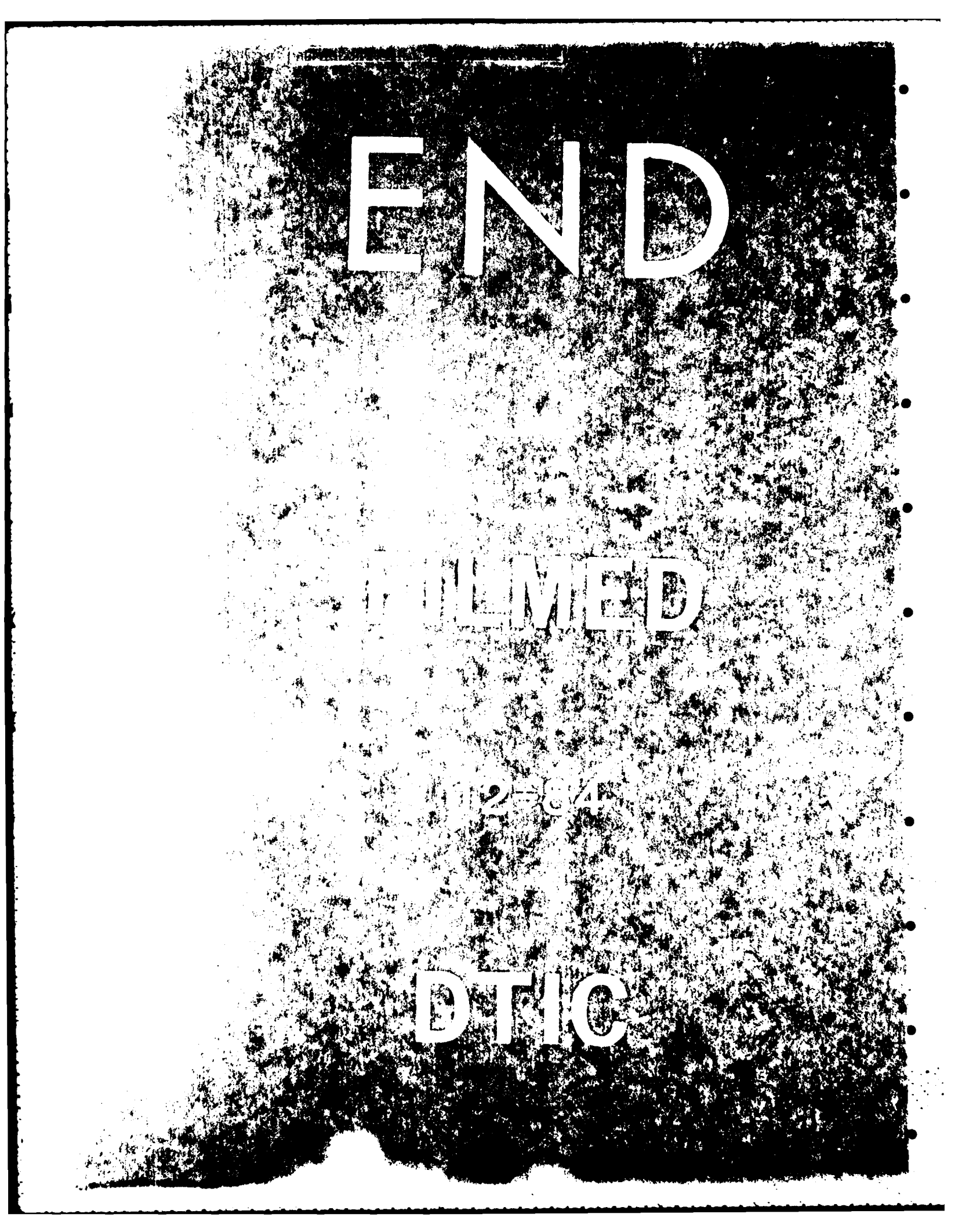
* Extracts from Regulation 17 of Chapter V of the 1960 Convention, application of which to fishing vessels and vessels of less than 500 tons gross when engaged on voyages, in the course of which pilots are likely to be employed, was recommended by IMCO in Resolution A.130(V).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